APR 21 1943

Sci Lib B.

for VICTORY .... Work Harder .... Stop Waste .... Buy Bonds

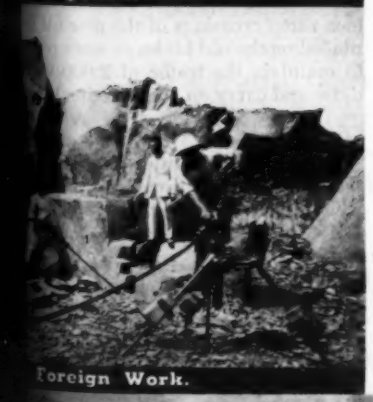
Contractors and Engineers Monthly

Vol. 40, No. 4 APRIL, 1943 $2 a Year, 20 Cents a Copy

POST-WAR PLANNING

Highways.

Irrigation.


Foreign Work.

To Insure a Stable World We Must Plan for Peace

★ OUR failure in the past 25 years to anticipate and plan for the world's problems is responsible for the present war with its want and anguish, ruthless destruction and mass murder. The results of this failure emphasize again the old motto "Be prepared". Peace is not merely the negative of military hostilities, nor is it just an admirable but nebulous ideal; it is a positive condition that can be attained and maintained. To most people—most of all to the men fighting this war—the objective in winning the war is to win the peace.

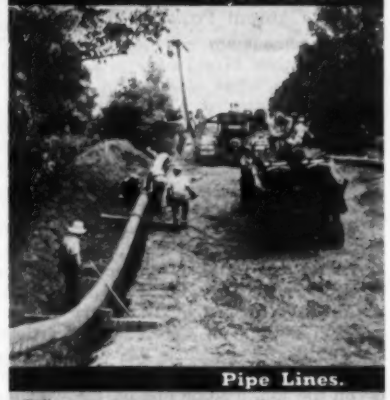
The key to a decent lasting peace is an equitable settlement of the international, national, economic and social problems of the world on a practical Christian basis. To obtain that objective we must have constructive planning.

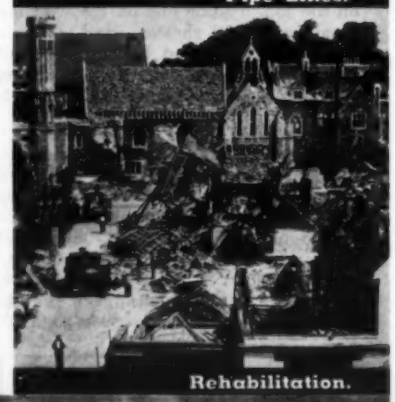
Time is an essential ingredient of all planning. Therefore, post-war plans must be initiated, developed and integrated, and a program of financing prepared, now, to insure an era of spiritual and economic peace after this demoralizing period of war hysteria and destruction.

To that end, CONTRACTORS AND ENGINEERS MONTHLY is launching in this issue a series of articles on post-war planning which will outline, as we see them, the needs, the possibilities, and the opportunities in the post-war world, and the place which engineers and contractors will have in meeting those needs, developing those possibilities, and sharing in the opportunities to rebuild a world dedicated to the maintenance of peace and the fundamental rights of mankind.

(See page 4 for first article in series)

Water Power.


Pipe Lines.


Rehabilitation.

Flood Control.

Airports.

Highlights Of This Issue

- **Post-War Planning**
  "To plan or not to plan" for our post-war problems is a much mooted question. However, for the construction industry, plans are nothing new—plans and blueprints are the basis of all constructive activity. We are therefore launching in this issue a series of articles on post-war planning, particularly for the various types of construction to restore our war-worn highways and structures, and to provide employment and economic stability.
  See pages 1 and 4.

- **Construction for the Army**
  Among the feature articles of this issue are three describing entirely different phases of U. S. Army construction. One deals with the efficient batching-plant set-up for the concreting at an Army Ordnance Depot; another, with the work on a 5,813-foot earth dam to provide water urgently needed by war industries, as well as for flood control; and the third describes the methods of pouring the concrete floors for Army Air Field hangars. See pages 2 and 26.

- **Wartime Road Work**
  Access-road and SN highway work still goes on to furnish the transportation facilities deemed essential to the war effort. A mine-to-market highway project in Arizona, relocating U. S. 60-70, involved a number of heavy rock cuts. A 4.1-mile oil-mat job in Wyoming provides a new access road to Fort F. E. Warren; and several Army access roads built by a county in Ohio are described. See pages 2, 11, and 21.

- **Soil-Cement Parking Aprons**
  Soil-cement was selected as the quickest method of expanding the parking-apron facilities at an Army Air Field in the Southwest. The methods used in completing the 208,000 square yards of soil-cement paving are described in this issue. See page 13.

- **Equipment Care**
  An interesting suggestion for keeping "on tap" helpful information on the care and maintenance of equipment and the conservation of vital materials is contained in the article "A Library of Ideas Aids Equipment Care." Other articles you should not miss, because of their importance in keeping your equipment on the job, include one on the wartime repair of cable sheaves, and a comprehensive article on bucket care and repair, including ways of rebuilding worn parts. See pages 15, 20, and 35.

- **Save Manpower for Warpower**
  The National Safety Council is conducting a vigorous nation-wide campaign for safety in order to "save manpower for warpower." One of the more hazardous tasks in the construction and quarry field is the handling of explosives. Some very pertinent hints on how to do this safely appear in this issue. See page 30.

IN THIS ISSUE

Airport Construction	13
Alcan Highway	25
Bituminous Paving	2, 11
Bridges	6, 28
Care of Equipment	7, 15, 20, 35, 45
Cartoons	4
Concrete Construction	2, 26
County Road Work	21
Culverts	39
Dam Construction	2
Editorials	1, 4
Explosives	30
Grading	2, 28, 57
Highway Finances	52, 59
Highway Shops	8
Legal Decisions	61, 63
News Photos	32, 33
Post-War Planning	1, 4, 57, 62
Road Maintenance	16, 39, 44, 49, 52
Roadside Development	10, 17, 50
Safety	30
Soil-Cement	13
Wartime Rulings	6, 12, 23, 55

Big Batching Plant At Ordnance Depot

Fast Batching for Fleet Of Nineteen 4-Yard Truck Mixers Made Possible by Careful Planning

✦ IN order to keep a fleet of fourteen Jaeger and five Blaw-Knox truck mixers operating at full capacity, the contractor at a mountain-state Ordnance Depot took special care in laying out the plant for handling aggregates and cement, and delivering the 4-yard batches to the fleet of truck mixers. Delivery of both aggregates and cement in unconventional freight cars ran up the labor required at the plant, but the speed of batching was never slackened.

Unloading Materials

In order to facilitate handling the aggregates and the cement, the contractor built his own sidings off the main line of the Depot. A single pit beneath the track for the aggregates permitted dumping hopper-bottom cars directly into the conical hoppers, but many of the cars were the old side-dump outfits that required additional labor to get the material into the hoppers. Four men handled the maximum number of hopper-bottom cars easily but ten were needed when a train of the old side-dumps arrived. Both sand and coarse aggregates were dumped into the same pit but to separate hoppers and then again sorted at the turntable at the top of the belt conveyer.

A 200-foot belt conveyor 30 inches wide ran from the gravity-feed hopper in the track pit right up to the top of the batching plant so that the materials were quickly stored where they could be used at once.

The cement was unloaded by the spiral conveyor of a Johnson Dutch Mill bulk-cement plant direct to a cement silo when the standard hopper-bottom cement cars were received and then only two men were required for the unloading. But when box cars were used for shipping the bulk cement, as many as ten men were required to get the same speed in delivering the cement to the silo. These men used Link-Belt scoops operated by Ford pick-up trucks in the absence of the usual automatic equipment which could not be purchased.

The Batching Plant

The long belt conveyor raised the aggregates to the top of the 120-ton 4-compartment bin, where two bins were used for the coarse aggregate, one for sand and one for cement, in addition to the separate cement silo. The pair of cement-storage facilities had a total capacity of 700 barrels. A trailer-type Gardner-Denver compressor at ground level was used to furnish the air for "fluffing" the cement in the hoppers to prevent arching and poor gravity flow to the batching scales. The operating crew, including the conveyor men, con-

(Concluded on page 7)

Mile-Long Earth Dam For Industrial Supply

New Dam in East Features Low-Water Regulation, Flood Control and Impounding of Water for War Industries

✦ A new earth dam is nearing completion in the east to supply water urgently needed by war industries, in addition to providing flood control of an erratic stream. The dam, built of earth excavated immediately at the site, was not compacted by any equipment other than the hauling units used to transport the clayey soil from the long downstream borrow pits an average haul of 200 to 500 feet to the dam. The crawler treads of the tractors and the pneumatic tires of the 8-yard trucks and 12-yard scrapers have provided a compacted fill weighing from 100 to 110 pounds per cubic foot, while the specifications call for only 90 pounds. No sheepsfoot tamping was used at any time.

The Earth Dikes

The total length of the dam is 5,813 feet which includes the left and right-bank dikes and 664 feet of concrete spillway in the center of the dam. The control section of the dam is of concrete. The entire area of the dikes was stripped for a depth of 6 to 12 inches by Continental scrapers and then a 2-foot selected base of pervious material was laid down over the entire area downstream of the exploration trench. The trench is 10 feet wide at the bottom, 20 feet wide at the top, and 5 feet deep. This was sufficiently deep to show any sand deposits. None were found nor was any rock lo-

(Continued on page 58)

U. S. E. D. Photo
Interior of initial cofferdam for an industrial water-supply dam, showing the aggregate trestle and concrete plant in the background.

C. & E. M. Photo
Widening in ledge rock on an Ariz mine-to-market road, U.S. 60-70.

Asphalt Road-Mix Through Rock Cu

Strategic-Network Proje On U.S. 60-70 in Arizo One of Series to Shor Distance and Travel Ti

(Photos on page 64)

✦ SEVERAL highway relocation ects have been completed recently nearing completion in Arizona to traffic through mountain passes mining areas of increased value present time. Straightening a mo highway is practically impossible the Arizona Highway Departme effect did the impossible on a 4 project recently where the mini curve was 9 degrees. Every adva was taken of openings in the co Hence, the new road, with maxim per cent grades and maximum 6-d curves, swings from one side of th yon to the other, water courses changed so that the old road becam stream bed, and the new road cr through block after block of hard ite to make a safe commercial high

All this required careful desig avoid the use of critical materials elimination of bridges by the use of fills, and careful planning not to di important highway traffic to new old mining properties. At one time teen ramp crossings of the new fill placed on the old highway were re to maintain the traffic of 2,000 ve daily and carry on construction.

Quantities

The major quantities involved i mountain construction 4 miles in le which was built for the low bi $245,317.11, were:

Excavation, roadway, unclassified	160,813 cu. yd.
Excavation, drainage	18,087 cu. yd.
Excavation, structural	2,584 cu. yd.
Station-yard overhaul	212,416 sta.-yd.
Cubic-yard-mile overhaul	12,264 cu.-yd.
Coarse-aggregate base course	23,097 tons
Fine-aggregate base course	16,361 tons
Sprinkling, 1000-gallon units	1,006 M gal.
Rolling	1,311 hours
Class A concrete	565 cu. yd.
Class D concrete	173 cu. yd.
Slope protection, 3-inch concrete blanket	145 cu. yd.
Reinforcing steel	88,874 lbs.
Corrugated metal pipe, 18-inch	74 ft.
" " " 24-inch	1,116 ft.
" " " 30-inch	396 ft.
" " " 36-inch	414 ft.
" " " 48-inch	110 ft.
Cement rubble masonry	313 cu. yd.
Mineral aggregate for road-mix	7,292 tons
Road oil, SC-4	123,705 gals.
Processing road-mix	8,959 miles
Emulsified asphalt for seal	121 tons
Screenings for seal	861 tons
Blotter material	250 tons

Heavy Rock Excavation

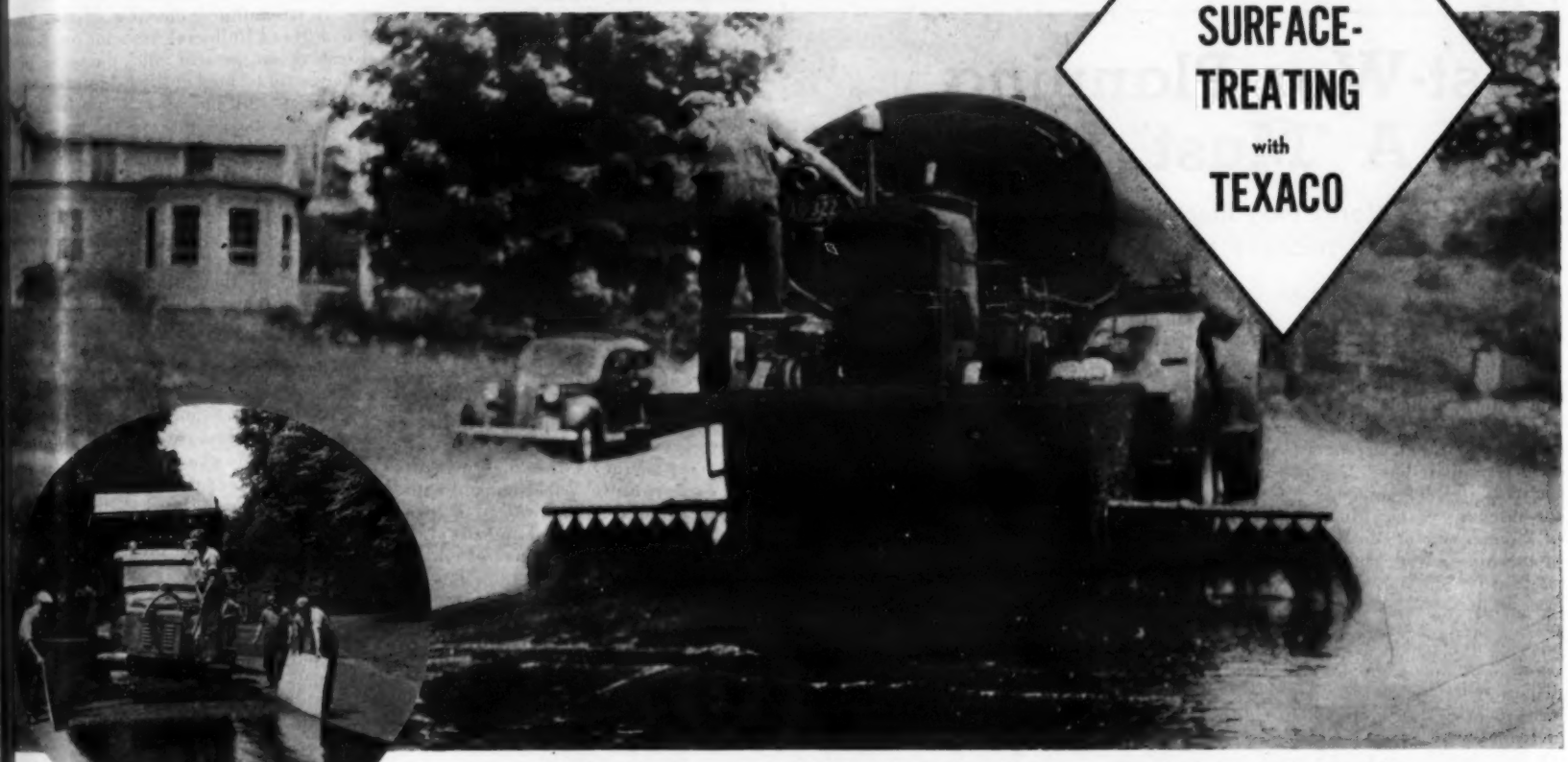
The unclassified excavation turne to be about 87 per cent rock, and exceedingly hard rock at that. A to 17,000 Timken detachable bits were on the hard granite of this job, inch the bits resharpened by an Ing Rand grinder. The job was well-don

(Continued on page 22)

Your post-war road or street program

A series of advertisements pointing out how TEXACO Asphaltic products can fit into your program

#1 SURFACE-TREATING with TEXACO



Surface-treating a road with TEXACO and applying cover material by mechanical spreader.

The United States is the world's best-paved nation. Yet thousands of miles of our streets and highways still remain in the "untreated" class—earth, sand-clay, clay-gravel, shale, caliche, gravel, waterbound macadam and similar types.

Until traffic on such roads and streets warrants more durable surfacing, inexpensive measures must be taken to give them waterproof, all-weather surfaces—surfaces which also will protect such roads from abrasion and resulting loss of material.

TEXACO Surface-treatments are the answer. A surface-treatment with the recommended grade of TEXACO Cutback Asphalt, Slow-curing Oil, Emulsified Asphalt, or soft Asphalt Cement forms a tough, waterproof, protective carpet, ranging up to ¾-inch in thickness.

A TEXACO Surface-treatment does more than waterproof untreated roads and streets and protect them from abrasion. It also is the first step in "stage construction." It provides an excellent base later on for one of the higher types of TEXACO Asphalt construction, made necessary by increasing traffic.

THE TEXAS COMPANY, *Asphalt Sales Dept.*, 135 East 42nd St., New York City

Boston Philadelphia Richmond Chicago Jacksonville Houston

TEXACO REG. T. M.

TEXACO ASPHALT

Contractors and Engineers Monthly

THE NATIONAL BUSINESS PAPER FOR CIVIL ENGINEERING
CONTRACTORS AND HIGHWAY ENGINEERS AND COMMISSIONERS

Member of Controlled Circulation Audit

Issued Monthly by Buttenheim-Dix Publishing Corp.
Editorial and Business Office: 470 Fourth Ave., New York City

Acceptance under the Act of June 5, 1934, authorized January 28, 1943
Printed in Mount Morris, Ill., U. S. A.

THEODORE REED KENDALL.....Editor — O. E. POTTER.....Managing Editor
EDGAR J. BUTTENHEIM.....President — DONALD V. BUTTENHEIM.....General Manager
GEORGE S. CONOVER.....Vice President — HERBERT K. SAXE.....Treasurer
MYRON MacLEOD*.....Advertising Manager

BRANCH OFFICES
Chicago, Ill., Daily News Bldg., George S. Conover, Vice President; John T. Dix*.
San Francisco, Calif., Mills Bldg., and Los Angeles, Calif., Western Pacific Bldg., Duncan A. Scott & Co.
* On leave of absence for military duty.

Copyright 1943 by Buttenheim-Dix Publishing Corp.

Post-War Planning A "Must" for Today

That the World May Rise Re-Created from This War, Government, Industry and Religion Must Liberalize

✦ THERE are many who hold that even a whisper of "post-war planning" is a sign of weakness, or overconfidence, or neglect of the war effort. Certainly we must place first the prosecution of the war with all diligence on all fronts until the enemies of democracy have yielded in "unconditional surrender." But planning is preparedness, the lack of which has cost the democracies so heavily in the past four years. Must we, as a result of the end of war, go through a period of unstable governments and threats of new "isms" in our own or in the liberated countries because of a failure to plan—to prepare? Must we experience a period of chaos in industry? Must we know years of unemployment for soldiers and war workers? The answer is an emphatic "No," if we plan carefully and unselfishly, giving consideration to our responsibilities to the great family of nations whose people are as important in the eyes of God as any "100 per cent American."

To the cynics who scoff at the possibility of ever solving these complicated world problems, we point to our own history. Wendell L. Willkie, speaking before the New York Herald Tribune Forum on Current Problems, said, "A war won without a purpose is a war won without victory. A most outstanding example of a war fought with a purpose was our own American Revolution . . . I think it is fair to say, in the light of what that freedom has meant to the world, that the victory of Yorktown was the greatest victory ever won by force of arms. But this was not because our army was large and formidable. It was because our purpose was so clear, so lofty, and so well-defined."

A military victory in the American Revolution must have seemed impossible to everyone but the gallant band of ragged hopefuls who were fighting for it. And when that victory was achieved, how much more hopeless was the task of building a united nation out of thirteen separate states, self-centered, prejudiced, disunited. The case for a United States looked just as desperate then as it looks now for a united world. But unity was accomplished because of the power of the idea behind the Revolution. To quote Mr. Willkie again, "For however important the role of bayonets and guns may have been in the development of mankind, the role of ideas has been vastly more important—and in the long run, more conclusive."

We *can* have peace and prosperity in the world any time the *idea* of peace becomes so important to people that they are willing to make the sacrifices for it which they will make for war.

Our Government Problems

We must have a National Government composed of elected representatives who will handle intelligently the problems of demobilization of our armed forces and of industry, so that the economic structure of this country is not threatened by wide-spread unemployment. They must make possible a continuation of American free enterprise, of opportunity for individual initiative and the competitive spirit, with only such restrictions as will provide an improved standard of living and insure employment and security for all. They must protect industry by a careful tapering off of war production so as not to destroy one industry in favor of another, or delay too long the reemployment of productive labor in the manufacture of our now rapidly decreasing stock of consumer goods. Education must be buttressed to eliminate the high percentage of "unfit" discovered during the selection of men for our armed forces. The 50 per cent unfit physical specimens comprise a load that must be lightened by intelligent birth control, pre-natal care, and proper physical education for parents and children. The 14 per cent of semi-illiterates, also brought to light by the same examination of our younger men for military service, is a responsibility of both national and state educational authorities.

Great as these national problems are, there are even vaster ones awaiting careful consideration in the field of international relations. If not solved by mutual planning while the war is still being fought and we stand shoulder to shoulder with the other United Nations, we shall find it difficult to cooperate in their solution once the competition for post-war trade begins. How shall the governments of conquered territories be re-established? How shall the petty demands of overactive nationalism be overcome permanently in foreign lands, as well as in our own? These are great problems for our State Department and our Congress to solve.

If government is to solve all these vast problems, to create a world worth having fought for, it must be backed by an awakened citizenry imbued with the Christian spirit to give practical backing to the precept of the Golden Rule. Here is the responsibility of the world's spiritual leaders today to prepare all people for the sacrifices for peace so that the pains of war may not have been in vain.

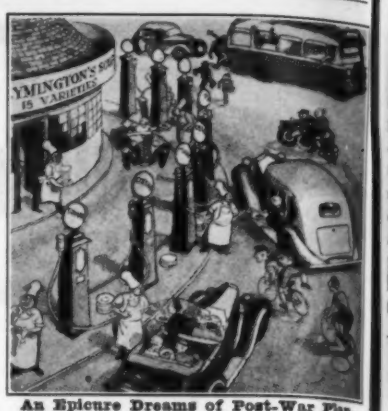
International Responsibilities

There is no longer any question of the desirability of this country's participation in an international cooperative effort to prevent war; some form of international policing is absolutely essential, lest some neurotic paper-hanger with a gift of oratory again mislead a people with promises of world domination. The inborn nationalistic concepts of our own and other countries must be modified to permit a greater unity of purpose. Whether under the banner of a League of Nations, a World Parliament and Council, or a United Nations Confederation matters not, but some international authority is just as necessary to permanent peace as the policeman on the corner for the protection of the neighborhood.

The same Confederation which will preserve peace will have a great and immediate task in the rehabilitation of the

(*Continued on page* 18)

WHAT WILL WE MAKE THIS TIME?



An Epicure Dreams of Post-War Planning—An Advertisement published in *Punch* and reproduced by permission of W. Symington & Co., Ltd., England.

ARBA Will Meet In Chicago in May

A streamlined meeting of the American Road Builders' Association, concentrating on present and post-war problems, will be held at the Edgewater Beach Hotel in Chicago May 5, 6 and 7. Because of war conditions, the Association will forego its regular convention and road show and will hold instead a business conference restricted to essential transactions directly related to the war effort.

Some of the problems slated for discussion are the utilization of construction equipment, the manufacture and distribution of repair parts, the potential construction program for 1943, highway maintenance, Federal assistance for the rehabilitation of war-torn highways, manpower, renegotiation of contract price regulation, restrictions on motor transport, and changes in Federal policy pertaining to construction.

Of equal importance will be the part of the program directed toward winning the peace. At least one meeting will be devoted entirely to post-war highway construction problems. Consideration will be given not only to a program for the improvement of the Federal-Aid system but equal emphasis will be placed on municipal and county street and road construction. It is expected that the Association will formulate a comprehensive post-war program embracing all agencies of government—Federal, state and local. The post-war sessions will be participated in by Federal planning officials as well as state and local officials and representatives of the highway construction industry.

At the same time the annual business meetings of the American Road Builders' Association and its various divisions will be held for the purpose of installing new officers and other business essential to their operations.

A Correction

In the report on tire wear tests on various road surfaces, published on page 7 of our February issue, the size of aggregate used as cover stone on bituminous roads should have been given as ¼ to ⅜-inch, instead of ⅛ to 1½-inch. While a maximum size of ½-inch was used in the Wyoming surfaces referred to in the report, the ⅜-inch maximum size is preferred.

It has been standard practice to use 10 pounds of cover stone for each 0.3 gallon per square yard of cut-back asphalt. In Wyoming, only 20 pounds of cover stone was used for a 0.3 gallon per square yard application. There was evidence of bleeding on these surfaces and for this reason 25 pounds of aggregate for a 0.3 gallon per square yard application of cut-back asphalt is recommended. This should still provide a slight excess of asphalt necessary for low tire wear without causing bleeding and a slippery-when-wet condition.

The regular purchase of War Bonds will insure Victory and the kind of Post War World we are fighting for.

Installing Wood Pipe

The curtailed production of many types of pipe because of wartime demands has resulted in an increasing use of Redwood pipe, which was widely used a generation ago on western sewage, drainage and water-supply and distribution systems, and for irrigation and hydro-electric supply lines. The present increasing use of Redwood pipe has made necessary an up-to-date bulletin on wood pipe construction. Such a bulletin has been prepared by the California Redwood Association, 405 Montgomery St., San Francisco, Calif.

By means of tables, text and drawings, the bulletin covers the problem of installation of four types of Redwood pipe: continuous stave pipe, machine banded pipe, bored pipe, and Redwood-lined metal pipe. Free copies of this bulletin, giving comprehensive information on the handling of these types of pipe, may be secured direct from the Association by mentioning this review.

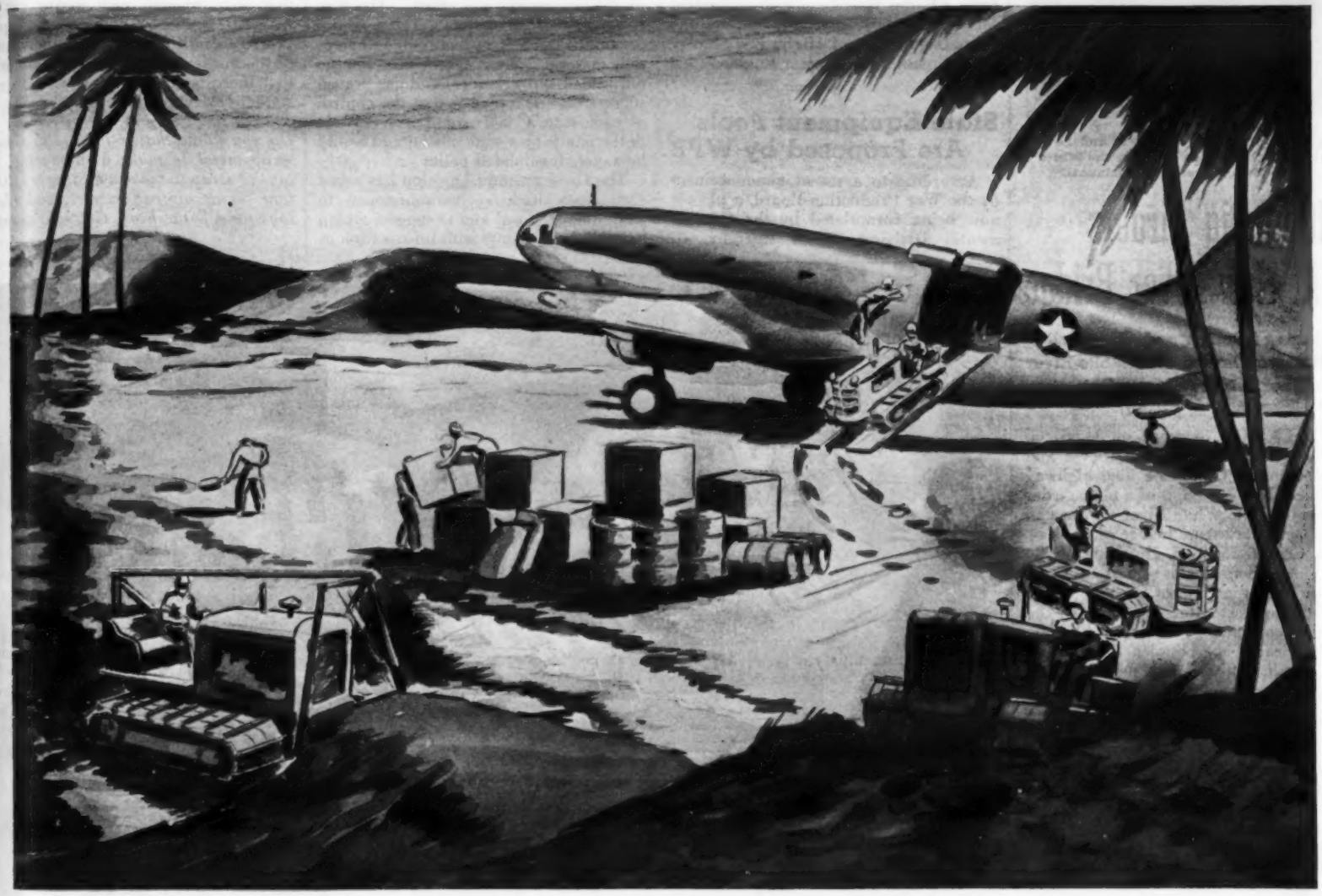
Care for Your Rubber

To assist in the mechanical rubber goods conservation program, a new booklet, "How to Lengthen the Life of Mechanical Rubber Goods", has recently been released by Pioneer Rubber Mills, 353 Sacramento St., San Francisco, Calif. Presented in the form of "field notes", the booklet contains practical pictures and explanations of proved ways to increase service from rubber belting and hose.

Copies of the booklet are available direct from Pioneer Rubber Mills.

Highway Dept. Saves Tires

The California Division of Highways has adopted tire-conservation measures which have resulted in a saving of 2,641,912 vehicle-miles from May to December, 1942. The Division's passenger-car mileage during that period dropped from 7,974,360 in 1941 to 5,332,448 in 1942, it is reported.



"The Engineers Have Landed"

HYDRAULICS Rodgers KEEP THE WORLD MOVING

Manufacturers of:
UNIVERSAL HYDRAULIC PRESSES
TRACK PRESS EQUIPMENT
HYDRAULIC KEEL BENDERS
HYDROSTATIC TEST UNITS
POWER TRACK WRENCHES
HYDRAULIC PLASTIC PRESSES
PORTABLE STRAIGHTENER FOR PIPE AND KELLYS

ONCE AGAIN the military engineers of the United States Army have accomplished an outstanding achievement in construction-breaking records. Huge cargo planes transporting engineers and heavy road building equipment have landed on the African coast. Advanced air bases have been constructed almost over night, overcoming unparalleled obstacles in engineering, making it possible for the armies of the United Nations to meet the enemy in the battle of Tunisia. ★ Rodgers Hydraulic Track Presses are furnishing speedy repair of vital track equipment, on all battle fronts. This equipment is recommended and approved by the engineering and servicing departments of every crawler tractor manufacturing company. ★ For many years Rodgers Hydraulic Track Press and Track Servicing Equipment have played an important part in the maintaining and servicing of crawler type tractors everywhere. ★ ***If it's a Rodgers, it's the best in Hydraulics.*** ★ Rodgers Hydraulic Inc., St. Louis Park, Minneapolis, Minn.

Rodgers HYDRAULIC Inc.

C. & E. M. Photo
The east-abutment cofferdam and 14 x 14½-inch foundation piles for the White River Bridge west of Cincinnati.

Lifting Big Girders At New River Bridge

Features of Design and Construction Of Highway Bridge over White River Near Elizabethtown, Ohio

(*Photo on page 64*)

✦ EXTENSION of work on U. S. 50 west of Cincinnati between Cleves and Elizabethtown, Ohio, as a dual highway included the completion of a plate-girder bridge over the White River adjacent to the double-track truss bridge of the New York Central railroad. Handling of the 150-foot girders in close quarters where the use of larger cranes was impossible provided a test of the ingenuity of the erection contractors.

The clear space between the existing railroad bridge and the new highway bridge was a scant 18 feet, leaving only sufficient room for a heavy single-track trestle for bringing in the plate girders. Each girder occupied two flat cars which were run onto the spur leading to the construction trestle. Erected across the spur was a heavy wood frame supporting a multiple sheave and a 17-part steel cable line with tongs for lifting the girders while the flat cars were pulled out. The girders were then lowered onto small trucks running on the standard-gage track for moving across the trestle to points opposite the girders' final positions on the piers and abutments. Each girder was then jacked up and cribbed, slid laterally onto cribbing placed on the piers, and slowly lowered by jacks into place.

The bridge structure consists of three plate girders spaced 31 feet 6 inches apart. At the west end these three 150-foot 9-inch girders rest on rockers, while at the first pier they rest on three bolsters giving fixed points. The next span is 153 feet 6 inches and the third span 150 feet 9 inches with rockers at each pier. The outside girders are 7 feet 6½ inches back to back of angles and have three cover plates top and bottom. The center girder is 9 feet ½ inch back to back of angles and has five cover plates top and bottom. At the easterly pier the center girder has a roller nest because of the extra weight at that point, which a simple bolster could not carry.

The foundation piles for the piers and abutments were all 14 x 14½-inch 73-pound H-beams, cut off and topped with a bearing plate before the footing concrete was poured. Three Jaeger Sure-Prime pumps were used to pump down and take care of leakage at the steel sheet pile cofferdams.

The 2.698-mile grading and paving project has two 22-foot roadways and a 4-foot mall between, with a white concrete sloping curb. At the sections of the project where there is a gutter adjacent to the mall, the mall width was reduced to 3 feet with the same width for the gutter. The 9-7-7-9-inch pavement has welded steel fabric reinforcing.

Personnel

The general contract for the grading, paving and bridge erection was awarded to The J. & F. Harig Co. and the DeSalvo Construction Co. of Cincinnati. The plate-girder bridge was fabricated by the Bethlehem Steel Co. This project was let and the steel acquired before the steel shortage became acute. Present practice in Ohio, of course, eliminates the extensive use of steel in any highway structures. Charles Harig was Superintendent for the general contractor, and for the Ohio Department of Highways, Stanley F. McCreadie was Project Engineer.

State Equipment Pools Are Proposed by WPB

According to a recent announcement by the War Production Board, a plan is now being formulated by the Governmental Division, WPB, whereby all state, county, and local governments will be assured of adequate equipment to maintain streets and highways for the duration. The plan is an equipment pooling arrangement, and its success is considered dependent entirely on the willingness of state and local authorities to cooperate, according to Maury Maverick, Director of the Division.

In urging the proposal, the Governmental Division stresses that road machinery is made almost entirely of critical materials and that any move to reduce the need for new equipment would advance the war effort. The War Production Board points out that such a pooling arrangement has been in operation in several areas this winter for the purpose of snow removal and has proved successful. The plan is that the control of each state's pool would rest entirely in the hands of a state official and would be a state-formulated policy.

The Governmental Division has asked each state highway commissioner to study the proposal and to suggest a plan suitable for his state with information as to what action would be necessary to make it official. The use of all types of equipment to be pooled under the plan would include snow-removal, road-construction and maintenance machinery. The pool would be handled by a duly designated state official whose duty it would be to dispatch necessary equipment to each section of his state where needed. Where state laws prohibit pooling, governors are asked to exercise such war emergency powers as they have to do the work.

The Governmental Division believes that only through such means can the nation's streets and highways be kept in proper condition to carry their share of the burdens of war and it is confident that there is enough equipment in each state to take care of the job.

Do you know that it takes 265 tons of scrap metal to make a submarine, 750 tons of scrap to make a destroyer, 10,000 tons for an aircraft carrier, and 17,500 tons for a battleship? Get your scrap in the fight.

AIMED AT THE AXIS
Via Compressed Air

DRIVING "tin fish" out of torpedo tubes and through the water to their Axis targets are exciting uses of compressed air.

In less exciting but just-as-important jobs throughout all industry, thousands of air compressors are delivering maximum output . . . lubricated with Texaco.

Texaco Alcaid, Algol or *Ursa Oils* keep compressors free from harmful gum, sludge and hard carbon deposits. Valves open wide and shut pressure tight; rings stay free, ports and air lines clear.

So effective have Texaco Lubricants proved in increasing output that they are definitely preferred in many important fields, a few of which are listed below.

A Texaco Lubrication Engineer will gladly cooperate in the selection of the most suitable lubricants for your equipment. Just phone the nearest of more than 2300 Texaco distributing points in the 48 States, or write:

The Texas Company, 135 East 42nd St., New York, N. Y.

THEY PREFER TEXACO

★More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.

★More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★More buses, more bus lines and more bus-miles are lubricated and fueled with Texaco than with any other brand.

★More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

TEXACO

TUNE IN FRED ALLEN EVERY SUNDAY NIGHT—C

A.G.C. Publishes Conservation Book

An 80-page manual, "Conservation of Construction Equipment and Facilities," has been published by the Associated General Contractors of America as an aid in the war effort, through conservation of critical materials and the maintenance of equipment, now impossible to replace, in usable condition for any performance which may be demanded of it. Of convenient pocket size, this book is designed for use by key men directly responsible for the operation and maintenance of equipment and critical materials.

The opening chapter of the book is entitled "Plant Layout" and presents suggestions for laying out a construction project so as to conserve manpower and economize in the use of critical materials. The topics covered include the general location; administrative, engineering and clerical space; open and enclosed storage space; storage of explosives; concrete and aggregate plants; and repair shops.

"Construction Equipment" is the title of the second section, which discusses equipping the project; the basic principles governing the use, care and repair of equipment; cleaning and painting equipment; lubrication; and welding, metal-spraying and blacksmithing.

Separate chapters are devoted to internal combustion engines; electric equipment; automobiles and trucks; and small tools. Rubber, wire rope, manila and hemp rope, and tarpaulins and canvas each is covered in a separate section, with practical suggestions for their care, use, conservation, and possible substitutes. Scaffolding and shoring, and steel piling and steel forms are also discussed.

Another section is devoted to the very important subjects of fire prevention and fire fighting, including a list of "Don'ts" to be observed in preventing and fighting fires. This is followed by a chapter on accident prevention and another on sabotage precautions which points out that, while on most government contracts there is a Protective Security Officer responsible for protection against sabotage, each employee on the job should be impressed with his or her responsibility in the matter.

The final chapter is devoted to salvage and reclamation which, the manual points out, is an activity which should be continuously and vigorously pursued. This discussion covers the collection of scrap, reclaiming possibilities, and segregation and disposal. Finally there is a glossary of maintenance hints, arranged alphabetically by the name of the machine or part, and a reference list giving the names of manufacturers of various kinds of equipment, from whom further literature and suggestions may be secured in connection with the maintenance of their equipment.

Copies of this manual "Conservation of Construction Equipment and Facilities" may be secured from the Construction Foundation, Munsey Bldg., Washington, D. C. Price: 50 cents a copy; $5.00 per dozen copies; and $25.00 per 100 copies.

Official U. S. Navy Photo

Lubricants and Fuels
FOR ALL CONTRACTORS' EQUIPMENT
HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

C. & E. M. Photo

The efficient batching plant which served a fleet of 14 truck mixers at a mountain-state Ordnance Depot.

Speedy Batching Layout at Army Depot

(*Continued from page 2*)

sisted of one man to operate both aggregate gates feeding the conveyor, one man for the turntable at the top feeding the aggregates to the proper bins, one scale man, and no man spotting the truck mixers as the drivers were required to do their own spotting.

The Johnson weigh batcher for weighing out the 4-yard dry batches for the big truck mixers had the cement scale at the right and the 2-beam aggregate scale at the left of the weighing platform. A Caterpillar diesel-electric plant near the batching plant at ground level furnished power for lighting the entire plant and area during night operation.

Water Service

In order to provide sufficient water for the plant, the contractor secured his own supply as he could not rely on the reservation supply. He dug a sump near a creek at the edge of the Depot and installed two Gorman-Rupp triplex road pumps to pump water to a horizontal tank elevated about 15 feet above ground near the batching plant so as to supply the truck mixers by gravity. The tank was 6 feet diameter, 24 feet long, and equipped with supply pipes and valves at both ends to speed up watering the truck mixers. Each of these machines was equipped with a 3-compartment water tank, one for the mixing water, one for water to be used for tempering the batch, and the third for wash water.

As the truck mixers approached the batching plant, they stopped at an elevated platform where the first man of the service crew opened the hatch lids. Then they went under the batching plant and received the dry batch. On driving out they went to the water tank to have the water supply in their tanks replenished and then the same men closed the hatches so that mixing could begin at once. At the plant there were also an engineer and an oiler to keep things shipshape and running smoothly.

Personnel

The concreting at this mountain-state Ordnance Depot was done by contract under the direction of the U. S. Engineer Department. In the interest of national security, mention of the location [illegible] and personnel connected with U. S. Army construction is omitted.

New Tournaweld Brochure

A new brochure in color, describing concisely the seven Tournaweld rods made by R. G. LeTourneau, Inc., Peoria, Ill., has just been issued by that company. Copies of this Form No. WT-108 may be secured direct from the manufacturer or its dealers.

A District Garage In Central Arkansas

Office, Garage and Shops For District No. 2 of the State Highway Dept. Typical Of Newer Facilities

(*Photos on page 64*)

✦ SEVEN of the garages and shops serving the ten state highway maintenance districts of Arkansas have been modernized within the past five years to provide better facilities for office and shop work. The new buildings at Pine Bluff, headquarters of District 2, are typical of these newer buildings and equipment. District 2 includes seven counties in which over 30,000 men and women are working on construction for the Federal government and at various plants engaged in war production. The highways of the District are therefore taking severe punishment due to the hauling of construction materials and the travel of employees to and from the operating plants.

The structure for the office and shop is 60 x 110 feet, while separate buildings are provided for grease storage and gasoline service, for sign making, for general servicing, and for equipment storage. All are of matching red brick within a 3-acre plot fenced for protection. The roofs of the larger buildings are carried on steel trusses with built-up asphalt roofing supported on steel columns in the walls and tied down against uplift due to tornados or other wind storms. The truss construction also eliminates columns within the floor area, leaving it free for moving equipment readily.

Office Building

The office building, completed in 1938, is 60 x 30 feet in plan and is the front portion of the combined office and shop structure. It contains the District Engineer's office, and an accounting office at the front, with a storage room for stationery, another for blueprints, field note books and with facilities for drafting. Another office directly behind the District Engineer's office is for the District Mechanic, Superintendent of Bridges, and assistants. Two lavatories and a refrigerated drinking fountain are provided.

The Repair Shop

At the front of the repair shop are a lavatory and shower for the mechanics and field men and a stock room from which material is issued only on work orders charging the parts or material to a specific piece of equipment or road or section. The stock room is well equipped with both wood and steel storage bins for all manner of parts and materials. Pine Bluff has been unusually fortunate in the past as there were many local distributors of parts and a wholesale hardware house so that the stocks of parts maintained were rather low. With the influx of much heavy construction, it became necessary as a protective measure greatly to increase the storage parts for the state equipment.

The local demand for mechanics has had a severe effect on the personnel of the shops which usually had three or four mechanics. At the time of our visit, only the District mechanic and one other mechanic were still in the service of the state and they were out on the road making an emergency repair.

The shop is well equipped for light as the entire north side of the shop is filled with ten wide windows, the south side has five windows, two large overhead doors and one small door, the west side has six large windows, and overhead are thirteen 200-watt reflector lights for night and winter work. Along the north wall is a continuous bench equipped with frequent air and electric outlets and several bench machines. These include a

C. & E. M. Photo
M. F. Hill, District Engineer, District 2, State Highway Department, Pine Bluff, Arkansas.

Sunnen general-purpose grinder, a double power grinder, two Black & Decker electric drills, a natural-gas heater for a soldering iron, four heavy vises, a power grinder and buffer, and a Sioux valve grinder.

On the floor the heavier equipment includes a Duro electric drill press, a Manley hydraulic press, an Auto-Lite spark-plug cleaner, a Smith portable acetylene welding outfit with cylinder carrier, an Allen complete engine tester, an Allen Unitron battery charger, and a General Electric portable electric welder, mounted on four pneumatic tires for shop work, which can be removed from its mounting for transportation to the job on any truck.

A bench on the south side of the shop, where the two 12 x 12-foot overhead doors are located, is used for vulcanizing and tire repair. Three old D-A lubricant drums are set up at the side of the shop and painted with the inscriptions: Old Dodge Parts, Old Ford Parts and Old Chevrolet Parts. These drums contain the hope of the District for future salvage to keep existing trucks in operation. Parts are sent to the Central Shops in Little Rock for repair and building up for re-use if possible.

The shop is equipped with hot and cold running water and a fuel-oil torch in a large "pot belly" stove for heating in winter.

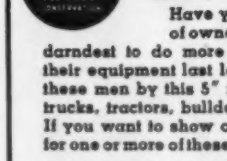
(*Concluded on page 24*)

Photo courtesy of Broderick & Bascom Rope Co.

C-o-n-s-t-r-u-c-t-i-o-n
E-q-u-i-p-m-e-n-t
C-o-n-s-e-r-v-a-t-i-o-n

. . . that sums up a big part of today and tomorrow's job

- New construction equipment is hard to get—that means you'll have to take care of what you have.
- Time-consuming breakdowns must be avoided as much as possible; emergency repairs must be made quickly, and frequently without the usual type of critical materials and parts.
- Jobs *must* be completed on time or ahead of schedule—that means extra work—faster, more skillful operation.



How About You?

Have you joined the ranks of the hundreds of owners and operators who are doing their darndest to do more with what they've got . . . to make their equipment last longer and work faster? You can tell these men by this 5" red, white and blue emblem on their trucks, tractors, bulldozers, shovels, cranes and scrapers. If you want to show others that you are conserving, write for one or more of these free emblems today.

THE THEW SHOVEL COMPANY
Lorain, Ohio

THEW-LORAIN CRANES • SHOVELS DRAGLINES • MOTO-CRANES

BARTLETT MFG. CO.
3015 E. Grand Blvd.
DETROIT, MICH.

Combination Pruner & Saw
AVAILABLE ON PRIORITIES

EASILY CARRIED IN SMALL CAR OR MOTOR-CYCLE.

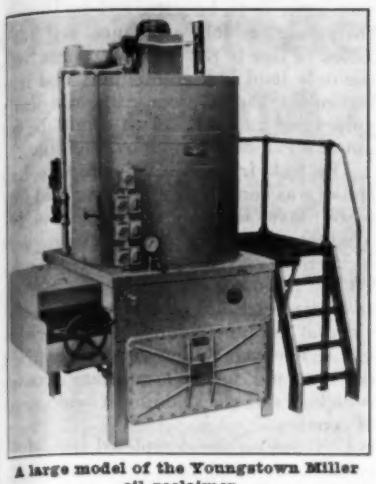
	Length	Weight
30 in. Pruner	29½	3 lbs.
30 in. Saw	29½	1½ lbs.
48 in. Section	47½	1½ lbs.
48 in. Section	47½	¾ lbs.
Total Weight		7 lbs.

This combination can be quickly and easily assembled to make either of these two tools:

1 Heavy Duty Tree Trimmer (Length capacity) 16½ ft.

1 Fast-cutting Pole Saw 16½ ft.

If longer lengths are required, specify extra sections 6 or 8 ft. long, or additional 6 ft. sections to make the necessary length.



A large model of the Youngstown Miller oil reclaimer.

New Oil Reclaimer Purifies Lubricants

Highway departments and contractors will be interested in the smaller capacity Youngstown Miller oil reclaimers which are being used by many municipal power plants for reclaiming diesel oil and by truck fleet operators. This purifier is of the contact earth filtration type utilizing common refinery earths available in the open market, and is designed to remove non-lubricating volatiles by slow heating. Solids and asphaltic materials are removed by filtering, and the unit is capable of removing fuel dilution, water, acids, solid and colloidal carbon as well as dirt and similar deleterious matter.

These machines are simple in operation. The dirty oil is charged to the reclaimer by a motor-driven dirty-oil pump that has an automatic float control for the quantity pumped into the machine. The operator next adds a bulk refiners earth, then turns on the switch which starts the electric heaters and agitator motor. The machine is controlled by a thermostat so that the operator is free to attend to other duties. When the mixture of heated oil and earth reaches the proper temperature, signal lights indicate to the operator that the batch is ready for delivery to the finished tanks through the filter press which separates the oil from the dirty earth. The earth remains, together with the contaminants which it has removed from the oil, in the filter press as a dry cake.

Complete information may be secured direct from the manufacturer, Youngstown Miller Co., Sandusky, Ohio, by referring to this descriptive text.

New Extension Light Has Safety Features

Adding to its line of specialized safety equipment, the Davis Emergency Equipment Co., 45 Halleck St., Newark, N. J., has recently announced a new safety extension light which is reported to eliminate the hazard of electric shock, even if the guard is removed. This new light has a heavy fibre guard and a new type of spring contact exclusive with the Davis company, and is so designed that the guard serves as the on-and-off switch. When it is unscrewed, the current is automatically cut off.

The light is made of indestructible materials to eliminate the need for repairs and replacements, and the entire device is of non-conductible materials, preventing electric shock to persons and the danger of short circuits. The bulb can be replaced quickly since the guard is removed without the use of tools.

Bulletin No. 1403 describing this new light, which is particularly adaptable for use in contractors' and highway department service shops and garages as well as for field shops, may be secured by those interested direct from the manufacturer by referring to this item.

A Truck Repair Manual

It is of the utmost importance that we keep the trucks of this country rolling as efficiently and as long as possible. *Motor's* Truck Repair Manual contains over 900 pages of detailed information, well-illustrated and with numerous charts and tables, on every American make of diesel and gasoline engine used in motor trucks, as well as every item from air cleaners to windshield wipers. The "in-betweens" include automatic chokes, axles, brake systems, carburetors, clutches, diesel pumps and injectors, fuel pumps, gasoline gages, generators, generator regulators, governors, headlamps, ignition systems, oil filters, transmissions, data on motor tune-up, shock absorbers, starting motors, starter switches, steering gears, universals and wheel alignment.

This monumental treatise on the care of the motor truck with data on every make may be purchased for $8.00 per copy from *Motor*, Book Dept., 572 Madison Ave., New York City.

ENGINEERS . . . CONTRACTORS

PLANNING BASES FOR POST-WAR PAVING?

. . . on Roads, Airports, Military Loading Areas

Do you know that the use of Solvay Calcium Chloride will:

(a) *Cut construction cost.*

(b) *Increase density.* Calcium Chloride makes it easier to achieve required density, and makes possible *increases* in density up to 5 lbs. per cu. ft., even in well-designed, graded aggregate mixtures.

(c) *Improve bond* between paved surfaces and bases.

(d) *Reduce frost action.*

Helpful information on these and many other important facts relating to bases for roads and airports can be found in Solvay's new booklet: "Better Bases for Better Surfaces." Write for it today—to Dept. 94-4.

SOLVAY SALES CORPORATION 40 Rector St. New York, N. Y.

SOLVAY CALCIUM CHLORIDE

NOW— Rust-Resistant Parts for all LeTourneau Equipment

Special Processing Protects Replacement Parts Against Rust and Corrosion During Shipment and Storage . . . Gives You Genuine Factory Parts in Factory-Finished Condition

Developed for Wartime Foreign Service — Now Available to All Users

A special process for treating replacement parts for LeTourneau equipment has been installed to prevent rusting and corroding during months of exposure to salt air and arctic and tropical conditions encountered in shipments and storage of war supplies. This same protection is now given parts for all LeTourneau equipment, both domestic and export shipments . . . at no extra cost to you.

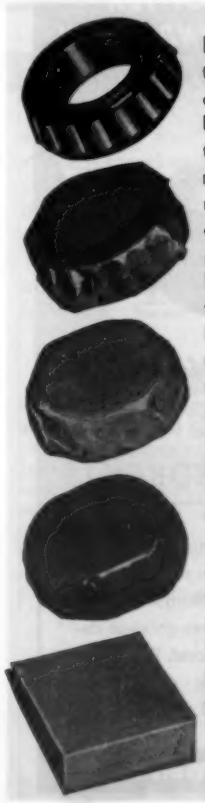
All machined parts first are thoroughly cleaned to remove all dirt and grease; then dipped in a special solution which gives a uniform, plastic-like coating to the entire surface of the parts. In tests this protective coating has resisted corrosion for 300 hours of exposure in salt spray. It is not sticky or greasy . . . thus, parts are easy to store and handle, do not collect dust and dirt. Coating does not chip off or rub off.

Saves You Time and Money

You save time and money when you get machined parts in good condition, free from rust, corrosion and grease . . . they are easier fitting, take less time and labor to fit . . . last longer because they're not damaged by corrosion . . . assure better equipment operation. The protective coating readily dissolves in oil and grease and has no harmful effect on the lubricating oil or grease used in LeTourneau equipment. If you prefer, the coating may be easily removed with fuel oil, gasoline, kerosene or lubricating oil before using the part.

Take advantage of this extra service . . . get rust-resistant parts for your LeTourneau equipment. Your LeTourneau-"Caterpillar" dealer's Victory Service Base is nearby . . . see him, now, for expert parts and repair service.

Machined sheave (above, left) is thoroughly washed . . . comes out free of grease and dirt (above, center) . . . is then dipped in special solution and dried giving a uniform, plastic-like coating (above, right) which prevents rusting and corrosion. Coated parts are placed in carton for protection against physical damage. On export shipments machined surfaces are further protected with water-tight, air-tight paper wrapping sealed with coat of wax.



Bearings of this type are adequately treated by the manufacturer to resist corrosion under normal domestic conditions. These photos illustrate how extra protection is given parts for export shipment by LeTourneau. Bearing is greased, wrapped in special grease-proof paper, wrapped again with heavy self-sealing wax paper and dipped in wax, thus making a water-tight, air-tight covering. Sealed bearing is then placed in carton ready for boxing.

Group at Award Dinner in Columbus, Ohio, when Middle West Roads Co. of Indianapolis, Ind., received CONTRACTORS AND ENGINEERS MONTHLY's 1941-1942 National Roadside Development Award. Left to right, T. W. Kinnear, Chief Construction Engineer, Ohio Department of Highways; Parker Bookwalter, Division Engineer, Division 8; Hal G. Sours, Director, Ohio Department of Highways; Theodore Reed Kendall, Editor of CONTRACTORS AND ENGINEERS MONTHLY; D. A. Hathaway, President, Middle West Roads Co.; Dallas D. Dupre, Jr., Ohio Landscape Architect; and Eugene Berkey, Superintendent for Middle West Roads Co.

Roadside Award Made At Meeting in Ohio

The National Roadside Development Award, given by CONTRACTORS AND ENGINEERS MONTHLY to the highway contractor making the greatest contribution to roadside development on a highway job during the 1941 and 1942 construction seasons, was presented to the Middle West Roads Co., Indianapolis, Ind., at a special dinner during the Third Annual Short Course on Roadside Development at the Ohio State University, Columbus, Ohio, February 25 and 26.

Dallas D. Dupre, Jr., Landscape Architect for the Ohio Department of Highways, presided, and Theodore Reed Kendall, Editor of CONTRACTORS AND ENGINEERS MONTHLY, spoke on the history of our Roadside Development Awards, described briefly the work of this year's Section and National Award winners, and then presented the Award certificate to D. A. Hathaway, President of the Middle West Roads Co., the National Award winner. (The work of this company which won the Award is described in C. & E. M., February, 1943, page 19.) A Certificate of Nomination was presented to the Ohio Department of Highways which nominated the Middle West Roads Co. and was accepted for the Department by Hal G. Sours, Director, who expressed his gratification that a contractor working on an Ohio project had received the honor of our National Award and then spoke of the fine spirit of teamwork on the part of Ohio Highway Department personnel.

Other features of the dinner meeting included a talk by Dean Charles E. MacQuigg, College of Engineering, Ohio State University, on the need for imagination in planning for future highway work, and by C. E. Swain, PRA District Engineer, on highway planning.

Those attending the dinner included Eugene Berkey, Superintendent for Middle West Roads Co. on the job which won the Award, Ohio state highway department engineers, division engineers and landscape architects, highway department engineers from neighboring states and others attending the Short Course on Roadside Development.

New 600-Mile Road Aids Australian War Effort

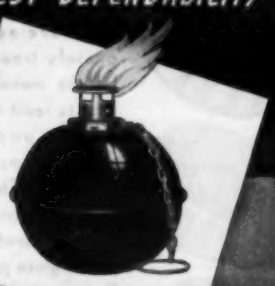
Australia's defense against possible Japanese invasion has been greatly strengthened by the construction of 600 miles of all-weather road through the center of the Northern Territory from Alice Springs to Larrimah. This highway soon is to be extended to Darwin, traversing a total distance of 1,000 miles. Prior to the opening of this road, the only land link with supply and reinforcement bases across Australia was a vulnerable railroad which might be put out of service for a time by bombing.

The link from Alice Springs to Larrimah was constructed in the record time of 87 days, with an initial cost of $1,573,000, according to a recent issue of *Highway Highlights*. Facilities for vehicle maintenance and meals for convoy personnel and other troops are provided at "staging camps" along the highway. Each camp has a workshop and services up to 200 military convoy vehicles each week, doing a wide range of repairs.

Convoys on the completed link of the north-south road now are traveling 3,000,000 miles a month, it is reported. After the war, it is expected that the highway will be of great value in settling and developing Australia's Northern Territory.

Buy U. S. War Bonds regularly.

LOWEST COST FOR HIGHEST DEPENDABILITY



Embury
Luck-E-Lite
HIGHWAY TORCHES

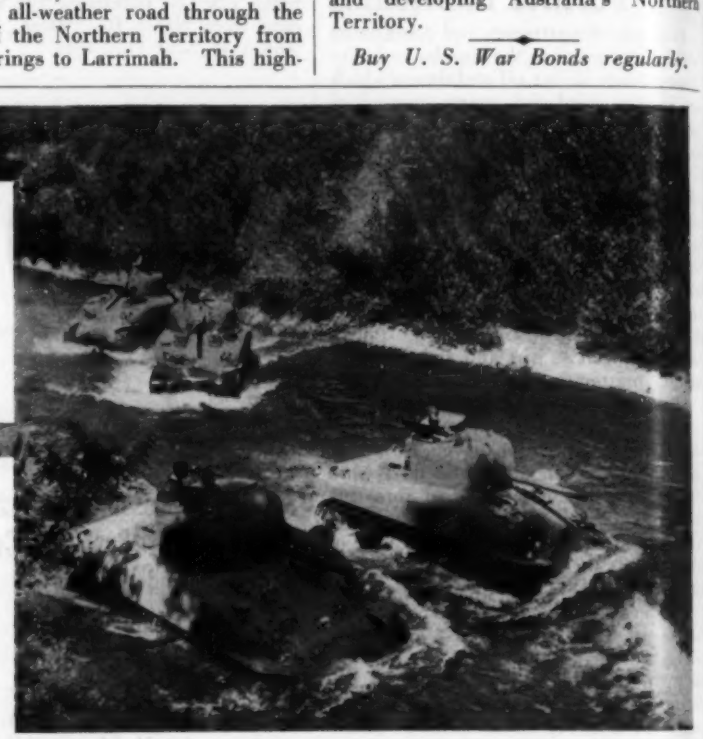
Comparative, impartial laboratory wind tunnel tests plus road performance under most gruelling conditions prove Luck-E-Lite gives greatest dependability at lowest cost. When you buy Luck-E-Lite you are getting actual predetermined safety.

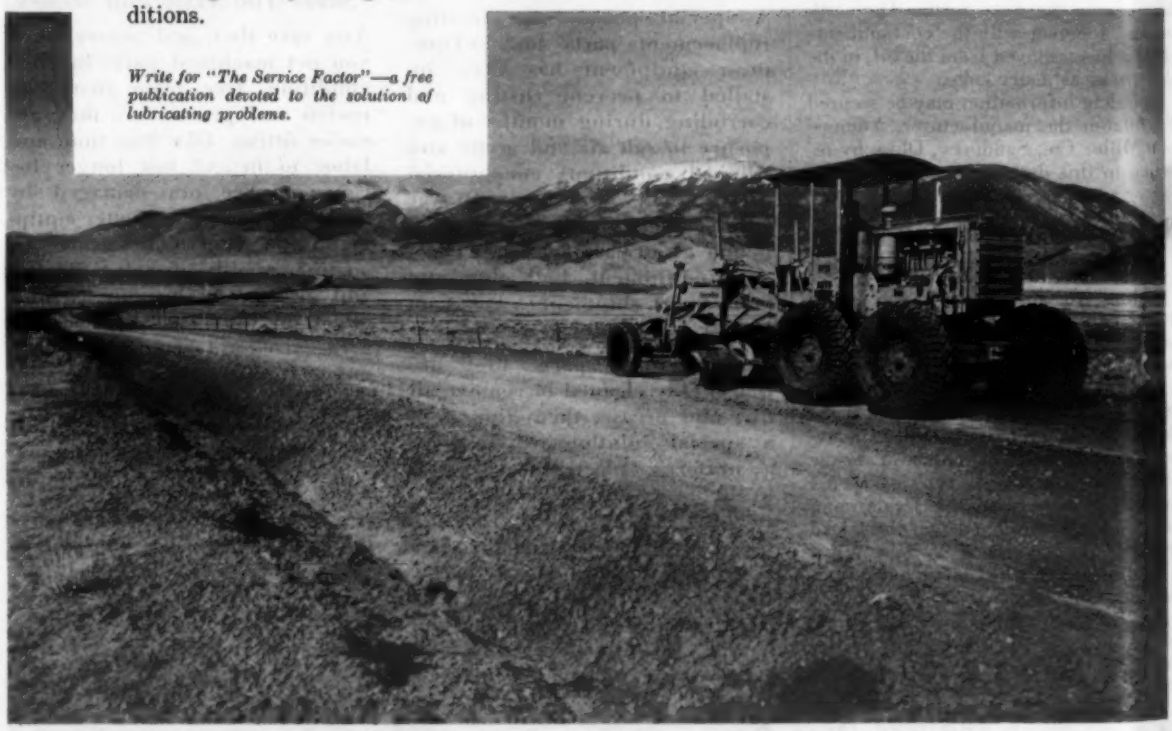
Embury Mfg. Co., Warsaw, N.Y.

TOTAL WAR needs total machine output. For full maintenance of operating efficiency in the *CONSTRUCTION* field use

SINCLAIR PENNSYLVANIA and OPALINE MOTOR OILS, specialized gear oils and greases. These lubricants cushion hard grind and keep equipment delivering top yield of continuous service hours under the toughest operating conditions.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.





SINCLAIR LUBRICANTS-FUELS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE NEAREST SINCLAIR OFFICE

SINCLAIR REFINING COMPANY (Inc.)

2540 West Cermak Road, Chicago · 10 West 51st Street, New York City · Rialto Bldg., Kansas City · 573 West Peachtree Street, Atlanta · Fair Building, Ft. Worth

Oil-Mat Access Road To QM Corps Center

H. W. Read, Contractor, Built New Entrance Road To Fort F. E. Warren; Typical Wyoming Oil-Mat

(*Photos on page 64*)

TO provide an outlet to the west for the Quartermaster Corps Replacement Center at Fort F. E. Warren in Wyoming, a 4.1-mile oil-mat surface was constructed on a new gravel base 36 feet wide by the Wyoming State Highway Department. The gravel base, 6 inches thick at the edges and 3½ inches thick at the center line, was primed full width with 0.4 gallon per square yard of MC-1 by the contractor, using his 1,200-gallon Etnyre pressure distributor.

Processing the Mat

The start of the operation of creating the 2-inch compacted oil mat was to windrow the gravel down the side of the base, but the contractor studied the traffic conditions on the road and decided to change immediately to windrowing down the center as it gave traffic a better break. As soon as this road was opened to traffic with the base complete, it was used by equipment traveling to and from the QM center and when the mat was completed it became a speedway for testing motorcycles and overhaul jobs.

The windrow contained 5.1 cubic feet of material per foot of length and was split into two windrows at the edge of the primed section to enable the Wood traveling mixer to handle it. The windrows were mixed by one pass of the mixer up one windrow and back the other, adding 4.07 per cent by weight of MC-3 in the mixing. The windrows were then aerated by three Caterpillar No. 12 diesel power graders, blended together, mixed into one windrow and placed down the center of the roadway.

Laying Down and Sealing

The mixed windrow was cut and laid down in thin layers by the graders to a template with a crown of 4 inches in the 31-foot width and then chip-sealed 24 feet wide with ½-inch maximum chips. The mat was compacted ahead of sealing by longitudinal rolling by a 10-ton tandem steel roller. For the seal the roadway was given a tack coat of RC-4 24 feet wide down the center at 0.33 gallon per square yard and covered with 24 pounds per square yard of the ½-inch maximum crushed-stone chips. This required three trips over the width of the seal by an 8-foot Buckeye chip spreader. The chips were then rolled by a 10-ton steel-wheel roller followed by a thorough rolling by a Bros pneumatic roller and finish-rolling by the steel wheel roller.

With a 6-foot bar on the Etnyre distributor, the contractor then applied 0.3 gallon per square yard of RC-4 to the exposed width of the mat outside the seal and to the primed base as a toughening seal.

C. & E. M. Photo

Contour harrowing of cut slopes aided quick germination of blown seeds to prevent erosion of natural ground cover.

Roadside Treatment and Bridge

All backslopes on the job were contour-harrowed parallel to the center line of the road to a depth of 6 inches in order to provide a catchment area for moisture to prevent erosion and also to catch seed blown by the wind and thus speed the germination of the seed and the development of a natural ground cover over these slopes as further protection against erosion.

At the ends of slopes the cuts were rounded to blend them into the landscape. This was most apparent at all entering roads where the cutting back of the slopes and blending into the slopes of the entering roads made the sections more natural than if they had been left with straight ends. The tops of the slopes at the right-of-way lines were also rounded to carry the slope into the adjacent fields naturally without

(*Concluded on page 27*)

HOISTS

STEAM • ELECTRIC
GASOLINE • DIESEL
AND
BELT DRIVEN

- FOR OVER 69 YEARS WE HAVE BEEN BUILDING FINE HOISTING MACHINERY
- OUR DUPLICATE PART SYSTEM INSURES PROPER FIT OF OUR FACTORY BUILT REPLACEMENTS
- FOR THE DEFENSE AND OFFENSE WAR EFFORT KEEP YOUR PRESENT HOIST IN GOOD WORKING CONDITION

We can help you!

We proudly fly these flags

LIDGERWOOD
Established 1874
MANUFACTURING COMPANY
Main Office and Works ELIZABETH, NEW JERSEY

Tanks for the Yanks • FASTER

It will give no aid or comfort to the enemy to see this Case-powered crane hustling the assembly of tanks somewhere in America. Instead, it is the threat of Yankee ingenuity, industrial cooperation and virile enterprise mobilized from the ways of peace to arm the free peoples of the earth in fighting for their freedoms.

Case-powered cranes are built in both the full-swinging style, shown here, and the simple non-swinging type with low center of gravity and high lifting and carrying capacity. Both single and double-drum types are available. Some are adaptable to bulk material handling as well as large pieces or packages. All have the extra utility of quick mobility on the job or from one job to another.

The stability and extra strength built into Case industrial tractors are obviously desirable in crane work. These qualities also pay off in speed and dependability with other tractor-mounted equipment. There are loaders that scrape up loose material, carry and dump it into truck or conveyor; power sweepers; winches; and snow plows from curb-climbing sidewalk sizes to big brutes that buck through deep banks blown up by blizzards.

Earmark of Case industrial tractors is endurance, born of a century's experience in building power machinery for out-door work. They are built in four basic sizes, with varying wheel and tire equipment to cover a weight range from 2500 to more than 10,000 pounds. Engines of the larger sizes are available as 40 and 60 horsepower belt-power units. For full information call your Case distributor.

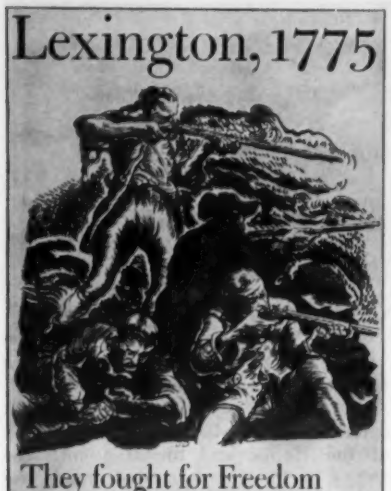
★ ★ ★

Case industrial tractors and power units are available to government agencies and private plants engaged in war work. Case engineering service is freely offered to such agencies and companies; also to others looking toward future developments that involve tractor power. If you have such power applications in mind, you are invited to get in touch with us. J. I. Case Co., Racine, Wis.

CASE ★ ★ ★ ★

BUILDERS OF *Power* THAT SEES THINGS THROUGH

Lexington, 1775



They fought for Freedom
We fight to keep it
BUY WAR STAMPS & BONDS

Gray Again Promoted By Asphalt Institute

At the annual meeting of the Board of Directors of The Asphalt Institute, Bernard E. Gray, Chief Engineer, was promoted to the position of General Manager in addition to that of Chief Engineer. Mr. Gray, who has been with the Institute for the past 13 years, successively as Highway Engineer, Chief Highway Engineer, and Chief Engineer, has held many outstanding positions in the highway field, starting with the Massachusetts Highway Commission followed by several years with the U. S. Bureau of Public Roads as Engineer-Economist, Highway Engineer, and Senior Highway Engineer. He was Orientation Officer with the 38th Artillery in World War I, and in 1919 was appointed a member of the Governor's Committee to write the new State Highway Law of West Virginia. He later became Division Engineer and Chief of Maintenance for West Virginia during its heavy construction era.

At this same meeting, the Board of Directors of The Asphalt Institute reelected Herbert Spencer President of the organization; with J. A. Blood, Standard Oil Co. of California, Chairman of the Executive Committee; and C. W. Barbour, Allied Materials Corp., H. B. Pullar, Berry Asphalt Co., David Waxman, Shell Oil Co., and Herbert Spencer completing the Committee.

BAILY CONCRETE VIBRATORS

PAVEMENT VIBRATORS

Three types: *Vibrating screed*, full-width, propelled by hand-operated winch and cable or pushed ahead by finishing machine. Gasoline power plant.

Tubular internal, extending entirely across slab, mounted in front of finisher. Gasoline or electric power plant with flexible shaft drive.

Vibrating pan, full-width, carried by two-wheeled trailer behind any standard finisher. Gasoline or electric power plant.

STRUCTURAL CONCRETE VIBRATORS

1, 3, and 4 H.P. gasoline, air-cooled, 4 cycle motors; flexible-shaft drive; interchangeable vibrator heads lubricated for life. Wheelbarrow carriers.

Pioneers in Concrete Vibrators

BAILY VIBRATOR CO.
1539 WOOD STREET, PHILADELPHIA, PA.

Other officers elected were: Vice Presidents, C. W. Barbour, Allied Materials Corp.; A. M. Maxwell, Standard Oil Co. (Ohio); Glenn Nielson, Husky Refining Co.; H. G. Nevitt, White Eagle Division, Socony-Vacuum Oil Co., Inc.; H. B. Pullar, Berry Asphalt Co.; F. V. Widger, The Texas Co.; and Roger Williams, Standard Oil Co. of Louisiana. George R. Christie, Standard Oil of New York, was elected Secretary and Treasurer, with John N. Smith of the same company as Assistant Treasurer.

Construction Equipment Production Streamlined

Effective March 15, the War Production Board imposed simplification measures on the manufacture of portable construction concrete mixers, truck mixer-agitators, and contractors' dewatering and supply pumps. According to WPB, this move will effect an overall 74 per cent reduction in the number of models and sizes hitherto manufactured and will increase production, bring about some saving in critical materials, and liquidate approximately 4,350 tons of slow-moving inventory.

Schedules V, VI and VII of Limitation Order L-217 limit the manufacture of portable mixers, mixer-agitators and pumps, respectively, to specified sizes, types and models while simplification measures are also imposed on accessories and on the use of paint and critical metals. Repair parts of all items are exempted, and orders for contractors' dewatering and supply pumps by and for the armed forces, the War Shipping Administration, and firms designated by the Navy as procurement agents are exempted from the provisions of Schedule VII.

Portable concrete mixers may be manufactured in only three specified sizes; truck mixer-agitators may be manufactured in only two specified models and in two sizes of each model; and the limitations on the manufacture of pumps reduces the number of types from 26 to 10.

The major part of the construction equipment covered in Schedules V, VI and VII is now being produced for war construction. The reduction in the great variety of types and sizes will facilitate repairs and reduce the number of spare parts which must be stocked in supply depots both here and abroad.

Euclid Engineer Takes New Assignment in Firm

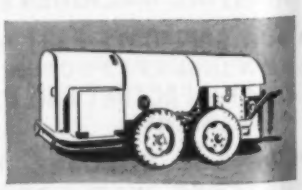
Virgil L. Snow, Assistant Chief Engineer of the Euclid Road Machinery Co., Cleveland, Ohio, has been assigned to new duties in the industrial field, it was announced at a recent conference of Euclid district representatives, factory engineers and production executives. In his new capacity as Industrial Engineer, Mr. Snow will work with mining companies, quarries and other concerns in the application, design and maintenance of Euclid equipment. This is in line with the Euclid program to help owners in servicing and maintaining Euclid equipment until replacements are again available.

Yes — Right Out of the Ocean
— and Here's How It's Done . .

*COMMON salt sea water is converted into safe, crystal-clear, distilled water — for drinking, cooking, and other purposes—by Cleaver-Brooks distilling units. Engineers of the Army, the Navy, and the Marine Corps roll these portable units to forward areas for a dependable source of drinking water supply. Enough of them are already in service to produce millions of gallons of distilled water daily — water so chemically pure it is used for submarine storage batteries.

Other types of Cleaver-Brooks equipment which guard the health and welfare of fighting men are mobile disinfecting and sterilizing equipment—portable shower bath units. All of this equipment makes effective use of the Cleaver-Brooks multi-pass down-draft heating principle first made famous in Cleaver-Brooks tank car heaters, bituminous boosters, and steam generators.

Cleaver-Brooks production right now is going 'round the clock for military needs, but we are glad to send complete information on tank car heaters, bituminous boosters, automatic steam plants — for your future needs.



CLEAVER-BROOKS COMPANY
5110 N. 33rd Street
Milwaukee, Wis. U. S. A.

Cleaver-Brooks

TANK CAR HEATERS . . . BITUMINOUS BOOSTERS . . . AUTOMATIC STEAM PLANTS

Soil-Cement Mixed By Three Machines

Four Parking Aprons at Southwest Training Field Completed in 7-Foot Lanes, Using 12 Per Cent Cement

♦ TO expand the parking-apron facilities for planes at a Southwest field used for the training of bombardiers, soil-cement was selected as the quickest method of completing the 208,000 square yards needed for the four areas involved. Local material was excellent in character for this purpose and a sandy-loam borrow area within the reservation provided most of the 8 inches of material. To this was added 22,000 cubic yards of concrete sand giving a good concrete gradation with no stone larger than ¾-inch and about 95 per cent finer.

Preparing the Aggregates

The selected material from the local borrow area was spread 8 inches thick over the entire apron area, the largest of which was 123,000 square yards. On this the concrete sand was spread as uniformly as possible and then the entire area mixed in 7-foot lanes by Gardner traveling mixers operating at the standard rate of 75 feet per minute used for all mixing operations. The soil and sand were very dry, as the work was started ahead of the rainy period of August, so that the mixers would not pick it up readily without added moisture. To facilitate mixing, watering trucks of large capacity on Fruehauf semi-trailers were used to add the water rapidly. After mixing, the material was graded over the entire area by Caterpillar No. 11 and No. 12 power graders.

In final preparation for the soil-cement operation, 18-inch furrows were plowed 6 inches into the soil-sand mix 7 feet on centers. This was done by the power grader, using a buster plow attached to the scarifier. These acted as guides for the mixers for the soil-cement operation both as to line and grade for depth of mixing.

Spreading Cement

Large trucks and semi-trailers carrying 120 and 265 sacks of cement respectively were used to haul out the cement. They were driven alongside a furrow and the cement tossed off by three men on the trucks and spotted by four men on the ground. As soon as the cement for one space between furrows had been spotted, the adjacent furrow was plowed and then the next group of trucks drove in to deliver the cement for that lane. By this method the trucks always operated on an area that had not been plowed and consequently did not break down the furrows, destroying their effectiveness for the mixers.

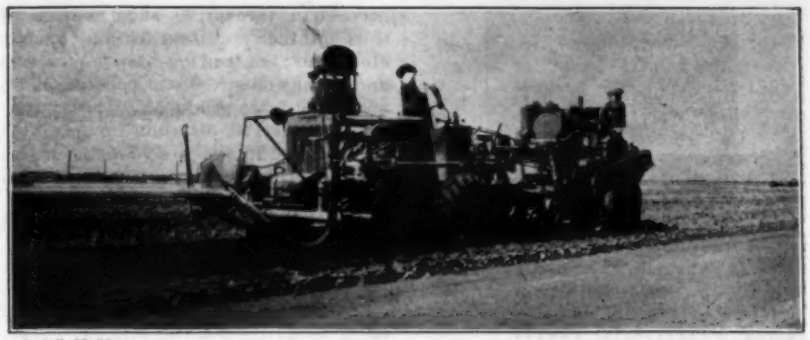
A single line of cement sacks 2.875 feet apart was laid down the center of the area between furrows which gave the 10 per cent by volume specified for the initial mixing. Two men clipped the wires on the sacks and four men following dumped the cement transversely between furrows. A Farmall tractor then pulled a spike-tooth harrow over the area, about 5½ feet wide, to spread the cement more uniformly along the lane to be mixed. The furrows were run the long way of the aprons to reduce the number of turns for the mixers.

The Mixing Operations

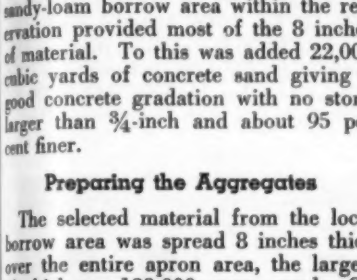
The cement spread over the surface of the lane was mixed dry by the first of the three Gardner traveling mixers, no water being added to the mix by this unit. The mixers were pulled by Caterpillar D8 tractors. Immediately behind the first mixer came the second with a tank truck alongside, mixing the material with from 1 to 1½ per cent more water than required for optimum moisture. This was necessary because of the dry air that caused excessive evaporation. Right behind the wet mixer came a third which remixed the moist soil-cement mix. Each of these machines left the material it had mixed in a windrow with a flat top and about 5½ feet wide at the bottom.

A Caterpillar No. 12 power grader was used to spread the final windrow behind the third Gardner mixer to its full 7-foot width. Then a Farmall tractor pulled a spring shank cultivator through the 6 inches of soil-cement mix to take out the compaction caused by

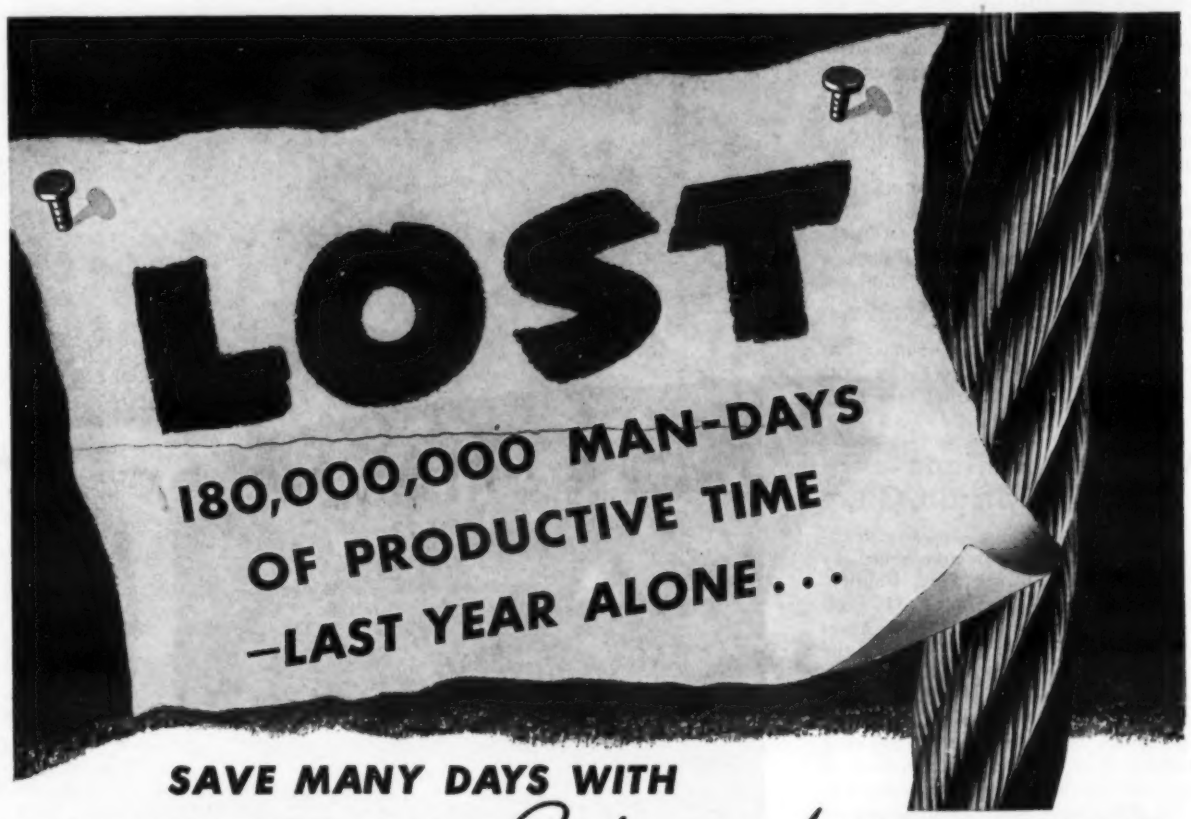
(*Concluded on page 34*)



C. & E. M. Photo
One of the three Gardner mixers processing the soil and cement for parking aprons at a Southwest Air Field.



HEATING KETTLES
Fire Proof—Oil Burning
Hand and Motor driven spray. Many sizes. Write for catalog.
White Mfg. Co.
ELKHART INDIANA



SAVE MANY DAYS WITH
AMERICAN CABLE **TRU•LAY** *Preformed* **WIRE ROPE**

Last year over 180 million man-days of productive time were lost through industrial accidents—many of them needless.

Just think how many tanks, ships, guns, planes and so forth could have been made with those 180,000,000 man-days of work. . . . With our soldiers, sailors and marines giving their all, twenty-four hours a day, it is a crime not to do everything possible to reduce this terrific toll on needed production.

AMERICAN CABLE TRU-LAY PREFORMED WIRE ROPE is helping many operators keep down accidents because it is a safer rope to use and handle. TRU-LAY PREFORMED resists kinking and snarling. It resists whipping; spools better. When crown wires in TRU-LAY PREFORMED become worn and broken they do not wicker out to become chisel-sharp jaggers to tear workmen's hands. They remain in place, making TRU-LAY *much* safer to handle.

Use AMERICAN CABLE TRU-LAY PREFORMED for your next rope. Do everything possible to reduce lost-time accidents. America needs your full-time production.

AMERICAN CABLE DIVISION
Wilkes-Barre, Pa., Atlanta, Chicago, Detroit, Denver, Los Angeles, New York, Philadelphia, Pittsburgh, Houston, San Francisco, Tacoma

AMERICAN CHAIN & CABLE COMPANY, Inc.
BRIDGEPORT • CONNECTICUT

ESSENTIAL PRODUCTS . . . TRU-LAY Aircraft, Automotive, and Industrial Controls, TRU-LOC Aircraft Terminals, AMERICAN CABLE Wire Rope, TRU-STOP Brakes, AMERICAN Chain, WEED Tire Chains, ACCO Malleable Castings, CAMPBELL Cutting Machines, FORD Hoists, Trolleys, HAZARD Wire Rope, Yacht Rigging, MANLEY Auto Service Equipment, OWEN Springs, PAGE Fence, Shaped Wire, Welding Wire, READING-PRATT & CADY Valves, READING Electric Steel Castings, WRIGHT Hoists, Cranes, Presses . . . *In Business for Your Safety*

The new Thor plastic electric drill.

New Portable Drill Now Made of Plastic

Announcement has just been made of the new Thor plastic ¼-inch portable electric drill by the Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill., after nearly a year in which large quantities of the drills have been produced under Army contract.

The grip handle, field case and gear case of the drill are constructed of a new tough light-weight Thorite plastic developed last May in Thor laboratories. This plastic-encased drill has been subjected to vigorous tests and is now in use by the Army all over the world, the manufacturer states. With military requirements on exclusive production of the Thor plastic drill now completed, the tool is for the first time made available to others engaged in war jobs.

According to the Thor Engineering Department, tests of the plastic drill have proved it to have more power per pound, greater strength and protection from shock, and to be more compact, lighter in weight, and cooler to handle than previous models.

Further information on this new Thor drill may be secured direct from the manufacturer by mentioning this item.

Wide Applications Of New Strain Gage

The new SR-4 strain gage for stress-strain analysis, recently announced by the Baldwin Southwark Div., Baldwin Locomotive Works, Paschall P. O., Philadelphia, Penna., combines the accuracy of the testing laboratory with the simplicity, convenience and reliability needed by engineers in the field, the manufacturer states. Among the many applications of these gages in the construction field are the determination of stress distribution on existing bridges to locate the points where reinforcing is necessary; measuring shear values of soils and the resulting effect on concrete abutments; measuring the contraction and expansion stresses in concrete slabs, and the stresses produced by heavy traffic over culverts; determining the action taking place in wall foundations during subway or tunnel construction; and many other uses.

This new gage consists of one, or a properly oriented group of two or three, fine wires cemented to the surface subject to stress change. These are connected, in a very simple arrangement of parts, to a portable Wheatstone bridge unit, whose unbalance becomes a measure of stress change. During a test, the two ends of each of these fine-gage wires vary in spatial relationship with strains in the surface to which they are cemented. The resistance of the gage wire varies with elongations or contractions of the gage. These variations disturb the balance of the bridge circuit, thereby affording a measure of the strain. There are also available numerous devices for the interpretation of the results of the test, including a portable strain indicator.

There are seven standard types of SR-4 gages now available and special types can be supplied if ordered in reasonable quantities. A new booklet on these gages describes in detail the various types, giving their dimensions and the many applications of this new instrument. Copies of this Bulletin 171 may be secured direct from the manufacturer by referring to this item.

1942 A.S.T.M. Standards

The recently completed 1942 Book of A.S.T.M. Standards, issued in three parts, contains in their latest approved form all of the American Society for Testing Materials' widely used specifications and tests for materials, definitions, and recommended practices. This latest edition has 1,090 specifications and standard methods which occupy more than 4,900 pages.

Continuing the policy first used in the 1939 edition, the latest book gives all specifications, whether formal standards or tentative, and is issued in three parts, as follows: Part I, ferrous and non-ferrous metals; Part II, non-metallic materials, constructional; and Part III, non-metallic materials, general. Each part has a complete subject index.

To keep the books up to date in 1943 and 1944, a supplement will be issued to each part in each of these years. As a service with the 1942 Book of Standards, there is a complete 200-page Index to Standards, which is furnished without additional charge and a copy accompanies the purchase of each part or complete set.

Copies of these Standards may be secured from the American Society for Testing Materials, 260 So. Broad St., Philadelphia, Penna., at the following prices: 1942 Book of Standards and Tentative Standards, Part I, II and III, $27.00 or $9.00 for any one part; Supplement for 1943, $9.00 for all three parts or $3.00 for any one part; and the same prices for the Supplement for 1944. For half-leather binding, add $1.00 for each Part and each Supplement Part.

GRIFFIN

RIFFIN

WELLPOINT SYSTEMS

JETTING PUMPS

FOR SALE RENT

Prompt Shipments

Send for our New 60 page illustrated catalog

"GRIFFIN POINTED WELLPOINT FACTS" chock full of latest information on Wellpoint Systems for dewatering, emergency and permanent water supply systems, also information on pressure pumps and data for jetting.

GRIFFIN WELLPOINT CORP.

881 EAST 141st ST. • NEW YORK, N. Y.

Phones: MElrose 5-7704-5-6

WAR JOBS WELL DONE
MEAN LOWER FUTURE POWER COST

SCARCELY anything you can name fills so many different war jobs as the General Motors Diesel engine. In tanks, landing boats, patrol boats, trucks, tractors and auxiliaries—everywhere sturdy dependability is needed—they're supplying power for our fighting forces.

The result is that though plant facilities have mushroomed and production records are broken time and time again, everything we can make is hustled off to war.

But there is this important compensation. These accelerated war demands are advancing GM Diesel production and technique years faster than could the demands of ordinary peacetime manufacture.

So we can look forward to lower-cost power and to new peacetime applications for these engines when the war is won—to broadened fields where this power will serve.

New eras of railroading follow in the footsteps of war. Another new era of railroading is assured in the wake of this war. General Motors Diesel locomotives already are establishing new standards of transportation.

GM GENERAL MOTORS DIESEL POWER

ENGINES . . . . . 19 to 350 H.P. DETROIT DIESEL ENGINE DIVISION, Detroit, Mich.

ENGINES . 300 to 2000 H.P. CLEVELAND DIESEL ENGINE DIVISION, Cleveland, Ohio

LOCOMOTIVES . . . . . ELECTRO-MOTIVE DIVISION, La Grange, Ill.

A Library of Ideas Aids Equipment Care

Office Files of Articles, Ads and Folders on Care Of Equipment Lead Way To Improved Maintenance

By HOWARD R. BIGHAM,
Consumers Sand Co., Topeka, Kansas

FIVE years ago the answer for a worn cable or sheave, a faulty clutch or a loose bearing, was "Replace it." Maybe the operator had to use a little extra salesmanship with the executive office or purchasing agent, but that was all. New parts and equipment needed were delivered on order and promptly. A catalog, plus occasional persuasion, was the only requirement.

With December, 1941, came a complete change and in our case, with the change, a doubling in the output requirement per unit. The problem now is how to make existing equipment deliver to the limit and last for the duration.

Here at the Consumers Sand Co. the catalog has been replaced by an office file which we call our "Library of Ideas." In this file we have clippings of articles from publications in our field telling how others have been able to solve their maintenance and replacement and repair problems without using new equipment. We have articles on shortcuts and improvements in methods which have meant longer life for machines for others in the same line of business. Our file also contains folders from manufacturers and advertisements clipped from magazines which show improved methods and suggestions for securing longer life.

Not long ago there was an article in a leading magazine in our field giving case history and records to prove that for certain operators, with certain types of machines where wire rope was used at high speed over small drums, the preformed outlasted the ordinary lay 3 to 1. This article showed the difference in initial cost and the actual net life-cost, averaged for nine specific ropes over a set period of time. In the nine cases the initial cost was slightly over 15 per cent higher. But taking the life of the rope into cost consideration, the cash spent for preformed rope doing the same type of job was 69 per cent less than the cash spent for ordinary rope. In this case, the difference in initial cost was of very little significance.

We had kept no such rope record. For some time we had used preformed because we liked it better. But here in our clipping file was a case history which proved our contention and furnished the additional fact that, besides the operation advantages, the life cost for preformed was about one third the life cost for ordinary.

We wrote to the man who had made this test and obtained for our files additional information. We now have as complete a record on this as we could have if we had conducted the tests at our plant with our own equipment.

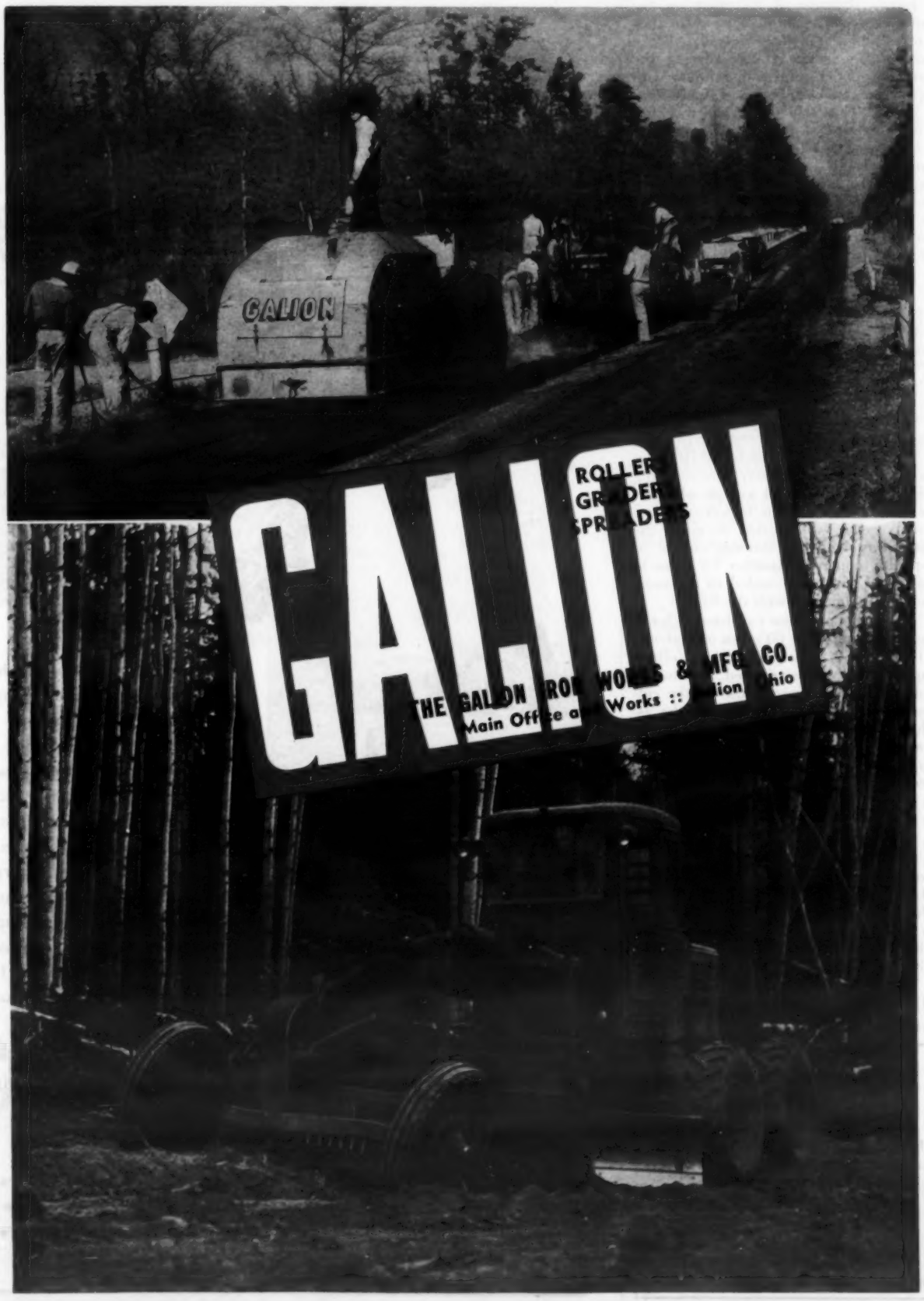
Take another example, an article on pages 11 and 53 in the October, 1942, issue of CONTRACTORS AND ENGINEERS MONTHLY. Here, in brief form, we learned how the California Rock & Gravel Co. has been able to extend the life of crusher and screening equipment. The article described what the company was able to do through improvised welding practices, new screen sections, built-up crusher plates, etc. They too had experienced longer life from using preformed, and in the article there was a suggestion for making old cable serve again. This is only a part of the valuable information to be found in that one article on file in our Library of Ideas.

In a recent American Chain & Cable advertisement used in a number of national magazines devoted to the engineering and construction field, there were listed eleven suggestions for making wire rope last longer. Most machine operators know the facts contained in that advertisement, or at one time or another they did know them. But having the list clipped and on file for convenient study and reference has meant that I have taken better care of my cables and machine. It has meant another thing. Recently it was my job to break in a new operator. Before we started out on the crane, we went to the file, read over the eleven suggestions, and then had them copied on a convenient card, in duplicate. I took one card and the new man took the other. This greatly speeded up breaking in the new operator and also gave him professional suggestions in handy outline form for reference.

The sixth suggestion in that advertisement read: "If the rope deviates from the center plane of the sheave more than 1½ degrees, undue wear will result." I knew that fact, but in going over the list of suggestions with the new operator, I checked and found the very condition as described. The sheave wheel was thinner on the near side. Damage to the rope, which was a fairly new one, was

(*Concluded on page* 31)

Howard R. Bigham, the author, examining the clutch on his crane.



STERLING LIGHT PLANTS

BUILD FOR DEFENSE with STERLING PUMPS HOISTS and LIGHT PLANTS

STERLING MACHINERY CORP.
405-13 Southwest Blvd., Kansas City, Mo.

Camp Traffic Damage Is Repaired by State

Construction and Military Traffic Nearly Wrecked Texas Highways; Resurfacing Program Saves Roads

✦ CONCENTRATION of war traffic on state highways not built to withstand such punishment has caused considerable damage to Texas roads. At one location in central Texas several camps and military depots are located radially from a county seat and the old roads were on poor alignment and grade. The Texas Highway Department was quick to recognize the extent to which the heavy construction traffic followed by continuous military traffic could damage the roads, so instituted a resurfacing program to strengthen the roads and provide a non-skid surface. Most of the work was completed in January, 1942, but a part continued on through April.

For a distance of 25 miles on the main east-west Federal highway in Bastrop County the heavy traffic broke through the surface, necessitating the patching of the failures in January with ¾-inch to 10-mesh stone, with RC-2 as a binder. Then the entire road was shot with 0.3 gallon of RC-2 and covered with 1 cubic yard per 100 square yards of the same stone. It is still necessary to take care of base failures by patching the surface, but the number of base failures due to water getting into the subgrade has been greatly reduced through the sealing of previous areas by this program.

At the other end of this same highway, in Travis County, 7 miles of road was treated to provide a non-skid surface. The base throughout this section is in much better condition. An asphaltic concrete was used for leveling at the rate of about 150 tons per mile of 18-foot road and then sealed in April, when the weather was warmer, with OA-230 and the ¾-inch to 10-mesh stone.

Another section of highway 10 miles in length in Travis County, also carrying heavy camp traffic and used as an alternate highway for traffic between the two county seats, was treated in much the same way with the leveling course of asphaltic concrete. Another 13 miles in Bastrop County was sealed in the same manner in January with the RC-2.

In all, this program consisted of leveling or sealing some 60 miles of highway with the RC-2, sealing being done following patching where required, and during cold weather, hence the use of the cut-back asphalt. The leveling with the asphaltic concrete was all done in April as was the sealing with the OA-230 which could be used effectively at that time because of the higher temperatures.

Safety Awards Made

Two manufacturers in the construction materials field have received the "Liberty Bell" Award made by *Liberty Magazine* for outstanding achievement in accident prevention, in connection with *Liberty's* weekly radio show "The Ghost Shift."

The first of these presentations of the "Liberty Bell," a wooden replica of the original Liberty Bell, was made to W. M. Powell, Safety Engineer for the Medusa Portland Cement Co., Cleveland, Ohio, because each of Medusa's eight plants had a perfect no-accident record during 1942 while operating at top speed and with a labor turnover of 30 per cent. Furthermore, the company has an accumulated record of more than 6,000,000 man-hours of accident-free operation.

The second "Liberty Bell" Award went to the Hercules Powder Co., Wilmington, Dela., the presentation being made to John S. Shaw, Hercules Safety Director. Hercules received the award for its fine record in making explosives in 1942, when the accident frequency rate was 32 per cent better and the accident severity rate 56 per cent better than in 1941, a record particularly commendable in view of expanded production schedules and increased man-hours under urgent wartime conditions.

Both companies were certified for the Award by the National Safety Council which is now conducting a nation-wide campaign "to save manpower for war-power."

Highway Maintenance Is Growing Critical

The disastrous effects on highways of one of the severest winters on record is precipitating a maintenance problem of critical proportions in many sections of the country, it is reported. This situation is made even more serious because of man-power and materials shortages, and in some instances lack of funds. Declines in highway maintenance personnel have reached 33 per cent on a national average, with Maine reporting a loss of 61 per cent of its maintenance man-power, according to a recent survey.

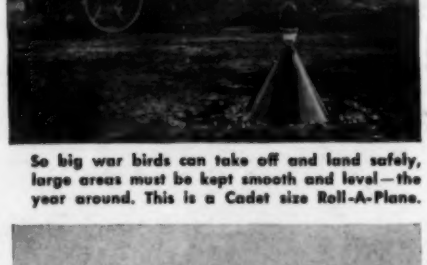
In some of the more congested war-production areas, street surfaces have become so badly worn that traffic is re-routed over other streets which, it is feared, will soon show equal deterioration. It is reported that there is some hope of securing preference ratings for maintenance materials but to date labor requirements have no status with the U. S. Employment Service.

The rural-road maintenance problem in some sections has been greatly aggravated by the opening of new mines and other projects in areas having no railroad facilities and no high-type surfaced highways. The resultant increase of traffic, and particularly of heavy loads, over secondary roads is reported to be causing rapid deterioration and it is feared that the maintenance problem this spring may reach almost unmanageable proportions.

Congress has given this situation some recognition by writing into a deficiency appropriation bill an additional $40,000,000 for the Public Roads Administration which, it is said, may be used for maintenance purposes.

The serious effect of deferred maintenance on wartime traffic and highway investment is being brought to the attention of Federal officials, with urgent requests for action in supplying labor, materials and funds.

This busy Austin-Western Tandem, at a Naval Supply Depot, is compacting a lot of surface, where things have to move fast. A single lever mounted on steering post controls both reversing clutches.



So big war birds can take off and land safely, large areas must be kept smooth and level—the year around. This is a Cadet size Roll-A-Plane.

Well compacted, smooth surfaced and properly crowned roads make for efficient lines of communication. The machine is an A-W Autocrat.

INDUCTED AS FAST as they leave the production line, rollers, for speeding up tasks like these, are now serving the Allied cause—in large numbers and on many fronts....Though built for peace they were READY FOR WAR.

Even before the conflict started, Austin-Western had finished the toughening-up process—made them stronger, safer and simpler to handle—to meet the fast pace and rigid needs of pre-war jobs. That's why they stand up under strain, respond to quick maneuvering and work with precision, day in and day out.

When the road to victory is "paved all the way," even better rollers will no doubt be on hand, to resume normal peace-time "rolls." In the meantime this company and ALL ITS DISTRIBUTORS *stand ready to serve you in every way possible.* THE AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Illinois. Distributors in Principal Cities. Cable Address: AWCO, Aurora.

BUILDERS OF ROAD MACHINERY
Austin Western
SINCE 1859

Austin-Western also builds Power Graders, Shovels and Cranes, Street Sweepers and a complete line of Rock Crushing and Screening Plants and kindred equipment.

Sealtight
PRODUCTS
For Airport Runways, Taxiways, etc., and other Concrete Paving Projects

ASPHALT JOINT FIBRE JOINT
POURED JOINT FILLER
POURED JOINT SEALER

W. R. MEADOWS, INC.
ELGIN ILLINOIS

Topsoiling Slopes On Utah Road Job

G. W. Mendenhall & Sons Receives Western Award For New Device Which Speeded Slope Dressing

(*Photo on page 64*)

+ THE winner of the Western Section Award in CONTRACTORS AND ENGINEERS MONTHLY's 1941-42 Roadside Development Awards was the G. W. Mendenhall & Sons Construction Co., Springville, Utah, for its work on a 3.784-mile highway grading contract on U. S. 91 near Lehi, Utah. The contract, which was awarded for $126,272.40, was started in June, 1940, and completed in May, 1941. On this job the highway has a roadbed of 72 feet 8 inches, with a maximum grade of 5 per cent and a maximum curve of 2 degrees. All cut slopes have a 10-foot rounding at the top, with 6 inches of topsoil placed on the entire surface of the slope. In high cuts and fills, the slope is 1½ to 1, and in shallow cuts and fills, it varies from 2 to 1 to 4 to 1.

Topsoiling a Feature

Topsoiling of slopes is generally a costly operation, requiring considerable labor and time. On this job, there was 15,000 yards of topsoil to be placed and dressed. Through the use of a device developed by W. D. Mendenhall, Superintendent for the contractor, labor, time and costs were substantially reduced.

This device consisted of a heavy rail, to which old grader blades were welded, and which was mounted on the forepart of a LeTourneau scraper frame by a double swivel joint. The weight of the scraper, which was loaded if necessary, provided plenty of ballast, and the double swivel joint permits swinging the rail in any direction through the use of cables and a power winch on the tractor. The winch is controlled by the tractor operator from his seat, even while the outfit is in motion. The advantage of this flexibility in operation is apparent, and really is necessary to the proper rounding and warping of slopes. The labor-saving feature is obvious in that only one man is required to run the outfit.

Spreading topsoil on a roadside slope on the G. W. Mendenhall & Sons highway grading job on U.S. 91 in Utah.

In operation, this unit moved over the rough slopes, as they were left after excavation, and smoothed them to a fairly accurate surface ready to receive the topsoil. The topsoil was then placed at the top of the cut and the machine pushed it down over the slope as it proceeded along the crest. It then moved to the toe of the cut and pulled the topsoil down the remaining section of the slope, making a uniform covering. Soil was moved up or down along the slope by changing the angle of the blade. Excess soil at the toe of the slope was picked up by the scraper in the same operation and taken where needed.

This procedure not only saved time and labor, and consequently costs, but resulted in a much better and more satisfactory job than could have been secured by hand labor.

The Contractor

The G. W. Mendenhall & Sons Construction Co. was formed by Guy W. Mendenhall, who died in July, 1942, and who was associated with early railroad construction in all the western states. His experiences in the construction field covered the period of development of earth-moving equipment, from the horse-drawn fresno and dump cart to our modern crawler tractors and dirt-moving scrapers of today. W. D. and V. C. Men-

(*Concluded on page 38*)

INSURE PROPER CONCRETE CURING

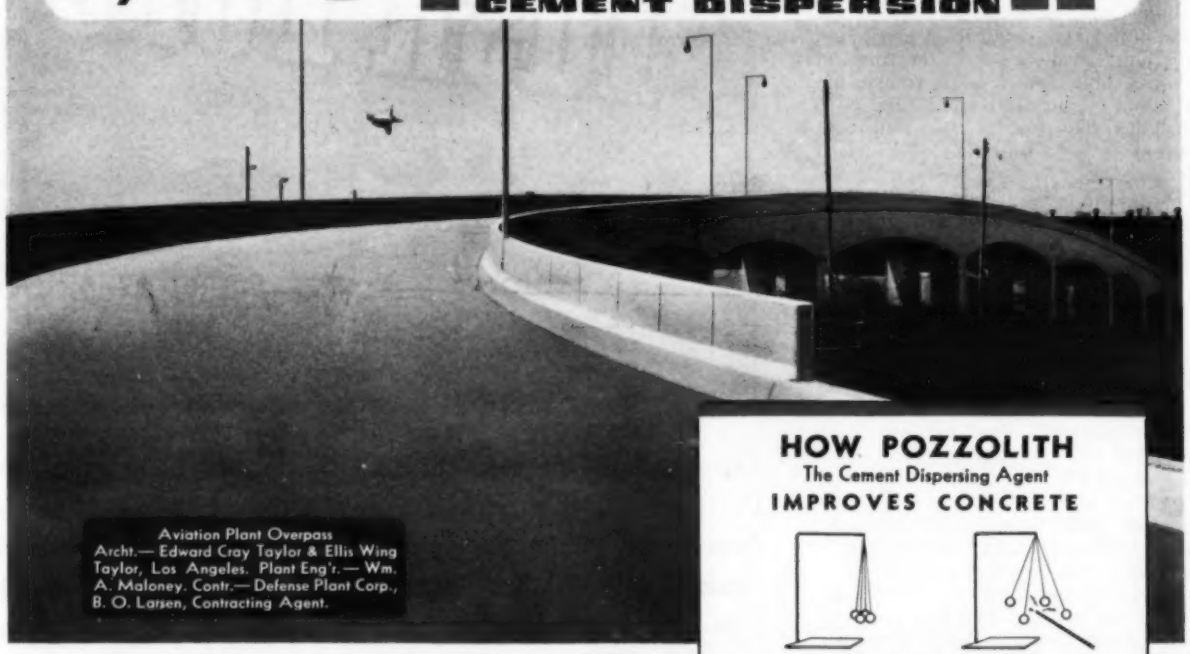
with

WILLIAMS SUB-GRADE PAPER

Write us for information on other Papers meeting Federal Specifications particularly UUP-536

WILLIAMS ROOFING PRODUCTS CO.
North Kansas City, Mo.

Placing Problem Solved by using POZZOLITH CEMENT DISPERSION



Aviation Plant Overpass
Archt.— Edward Cray Taylor & Ellis Wing Taylor, Los Angeles. Plant Eng'r.— Wm. A. Maloney. Contr.— Defense Plant Corp., B. O. Larsen, Contracting Agent.

CALIFORNIA BUILDER TELLS EXPERIENCE ON OVERPASS

ENTHUSIASTIC letters from leading builders tell the story of Pozzolith performance. The following is typical:

"In spite of the very poor grade of aggregate available, which consisted of a large percentage of flat and elongated stones, Pozzolith permitted faster pouring of concrete on the . . . Aircraft Company job. Decrease in the water-cement ratio increased water-tightness and durability."

EDWARD CRAY TAYLOR & ELLIS WING TAYLOR
Architects and Engineers — Los Angeles, Calif.

Many important defense projects located both within and without the boundaries of United States, present convincing evidence of the ability of Pozzolith to increase workability, placeability, strength, water-tightness, durability and lower costs.

Write for illustrated Pozzolith booklet and complete information on Cement Dispersion.

THE MASTER BUILDERS CO.
CLEVELAND, OHIO TORONTO, ONTARIO

HOW POZZOLITH
The Cement Dispersing Agent
IMPROVES CONCRETE

"Flocculated" Dispersed

Remember in physics how a group of suspended pith-balls would fly apart when given an electrostatic charge?

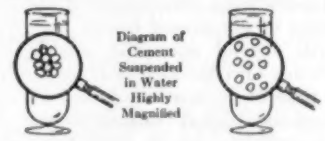


Diagram of Cement Suspended in Water Highly Magnified

Flocculated Dispersed

Similarly, cement particles which bunch together in water, or flocculate, are separated by this same electric force when Pozzolith is added to the mix. Thus greater cement surface area is made available to hydration, resulting in . . .

1. Putting more of the cement to work, by increasing the amount of hydration as much as 40%.
2. Increasing workability, producing up to 2½ times as much slump with the *same* amount of water.
3. Permitting up to 20% reduction in water, maintaining placeability . . . increasing strength . . . watertightness . . . and durability.

MASTER BUILDERS

Courtesy, S. J. Ray and Kansas City Star
Let's Not Put the Cart Before the Horse.

Cooperative Planning Is Necessary to Peace

(*Continued from page* 4)

devastated countries of the world. This nation must help to organize and send out peacetime expeditionary forces to aid these stricken people to rebuild their own cities and productive capacities. This must be done not in the spirit of "charity" but rather as a transfusion of our raw materials and money to strengthen the weak till vigor returns to them to carry on with their own revived life blood.

Our aid in reconstruction must not be allowed to develop into an American political or economic imperialism. Other countries for some time to come will be weak and staggering from the blows sustained in their fight for freedom. There is danger that we shall consider Lend-Lease full payment for the lives of other nationals who fought valiantly while we prepared in safety. Nor will the food and clothing and other aid which we shall send when the conquered countries are released from the dictators' relentless oppression give us the right to impress our will upon them. They must be nursed back to strength and permitted to make their own choice of government.

The international aspects of the post-war era are well stated in a pamphlet of the National Planning Association, No. 14, "When Demobilization Day Comes." "No matter how purely of domestic concern the problems of demobilization may appear, their international complications will be of far-reaching importance. The demobilization of our armed forces, for example, will depend upon the world need for policing once the victory is won. During the time of occupation, America and others of the United Nations must assume responsibility for at least two short-run decisions of tremendous importance.

"First, there will be the problem of feeding, at least until local or regional agricultural production and distribution can return to adequate proportions. Second, the occupied lands must be assisted in rehabilitating their productive facilities. There will be additional demands upon our own productive facilities at a time when we shall be involved in attempting to satisfy vast consumer demands within our own nation. The needs for control over domestic production in order to prevent inflation will become all the more important.

"Our influence and power to assist in rehabilitation will be so great that we can scarcely divorce ourselves of responsibility for the use that will be made of the assistance we shall render. If the war is worth winning, and the peace is to be a peace, we cannot wash our hands of the responsibility for insuring that other nations in the world set themselves upon the path toward economic prosperity and improvement of world living standards.

"In spite of the fact that demobilization is the tearing down of the machinery of our society required to achieve a victory, a post-war program cannot be merely negative in approach. The demobilization period should be considered as a transitional period implying a moving from one set of goals to another set of goals."

Speaking at Rockfeller Center, New York City, Under Secretary of State Sumner Welles stressed the importance of international cooperation, stating, "There can be no surer road to disaster, no surer means of bringing about unmitigated havoc in the future, than for the United Nations to enter the post-war period as rivals and opponents in their commercial and financial policies, rather than as collaborators in a common task of seeking and achieving international stability and general well-being. Together we can solve this gigantic problem; opposed to one another no one of us will profit. All would share the consequences of a general ruin."

Effect of Tariff and Trade Pacts

The artificial barriers set up to check an influx of foreign goods manufactured by cheap labor have been the subject of continuous controversy between our leading political parties for many years. There is developing a greater unanimity of opinion regarding tariffs, although anti-New Deal congressmen unite in fighting all attempts to reduce tariffs which allegedly protect American industry and labor. The following quotation from a recent address of Francis B. Sayre, Special Assistant to the Secretary of State of the United States, sets forth the situation as clearly and concisely as we have seen it, in relation to our post-war international economy:

(*Continued on next page*)

Operators of Rear-Dump and Bottom-Dump EUCLIDS, as well as those who service these units, make up a mighty important "task force" on the production front. Their jobs may lack the glory and adventure of action on the fighting front, but they're vital to victory just the same.

By careful operation and regular servicing to keep the "Eucs" rolling day in and day out, these men are helping to supply our mills and war plants with the coal, iron, aluminum, limestone and other materials that bring victory closer. Other jobs, too — airports, bases, military roads, etc., — are being completed in record time by Euclids and the men who drive them and keep 'em running.

The EUCLID ROAD MACHINERY CO. • • Cleveland, Ohio

EUCLID SELF-POWERED HAULING EQUIPMENT For EARTH . . ROCK . . COAL . . ORE
CRAWLER WAGONS • ROTARY SCRAPERS • TAMPING ROLLERS

Public Works Projects To Provide Employment

(*Continued from preceding page*)

"Industrial nations must trade to survive. Through poignant suffering, we have learned that accumulating trade barriers, choking and strangling international trade, spelled mounting unemployment and increasing hunger and deepening international hostility.

"No serious statesman in this day and generation advocates the complete elimination of all tariff walls. But responsible statesmen *do* advocate—and if we are to win the objectives for which the democracies are fighting they must insist upon—the elimination after the war of those unconscionable trade barriers which inescapably choke the flow of international trade, and as a result substantially depress the standard of living of entire peoples.

"The pre-war system of mounting and excessive tariffs, of quota restrictions, of artificial exchange controls, of government monopolies, of bilateralistic trade arrangements—the whole economic panoply of fighting devices to enforce some form or other of special privilege or unfair discrimination—all these must go if our criterion is to be, not the private profit of small pressure groups buttressed with political power, but the welfare and advancement of humanity.

"We must insist upon the enjoyment by all states, great and small, victor and vanquished, of access on equal terms to the trade and to the raw materials of the world which are needed for their economic prosperity."

Problems of Employment

Malcolm Pirnie, Consulting Engineer, New York City, speaking on Post-War Planning recently, said, "Obviously, some organized incentive for such planning by private industry is essential to make consumers' goods available rapidly enough to prevent the inflation which otherwise will occur. Between now and the end of the war more and more planning capacity will be available and should be used for conversion planning of private industry and for planning the needed public works. These should be initiated to meet the needs of any situation that will develop and to some extent may be necessary immediately following the end of the war if private-industry conversion needs have not been adequately planned by that time."

There is now being expended for the prosecution of the war the sum of $90,000,000,000 annually, which will be reduced to less than one quarter of that, about $20,000,000,000, within two years after the war ends. In that period, at least half of the approximately 10,000,000 men and women in the armed services and the 20,000,000 men and women employed in the manufacture of war goods will be released to engage in civilian pursuits. That means about 15,000,000 people for whom jobs must be provided immediately.

This colossal task cannot be postponed until the time comes to make use of their services in a peacetime world. The National Government, through its agencies, must plan ways and means to provide a better place for them to live, with more certainty of employment than in the pre-war era. The National Government will share this responsibility with the state and local governments, and with industry.

Demobilization at the end of this war will probably be a far slower process than after World War I. Under Secretary of War Patterson has said that the Army will help find jobs for those soldiers who need assistance through "a selective service system in reverse." Mr. Patterson told a group of industralists and business men, "There will be millions of soldiers demobilized. The Army alone cannot definitely guarantee every one of these demobilized soldiers a job, but it certainly is going to do its best to see that no man is mustered out of the ranks into the breadline." To illustrate what he called a "reverse selective service system," Mr. Patterson stated that if 100 steamfitters are needed in Chicago, 100 soldier steamfitters about to return to civilian life would be notified of the opportunity. It would be up to them whether they cared to take advantage of it.

If plans are carefully prepared now for a well-conceived program of economic reconstruction, we can have as nearly 100 per cent employment in the post-war era as during the drive for war production, we can raise our standard of living through better facilities for everyone, and at the same time remove the threat to our democratic institutions which will come from bitterness and resentment on the part of our returned fighting men because of lack of employment opportunities or the domination of this country's policies by any particular pressure group.

Government Post-War Projects

Federal activities in the post-war planning field are concentrated in the Federal construction agencies, such as the Federal Works Agency, which includes the Public Roads Administration; the Bureau of Reclamation; U. S. Engineer Corps (non-military river and harbor work); the Federal Housing Administration; National Park Service; and the TVA. Highways, flood-control and irriga-

Courtesy, J. H. Donahey and Cleveland Plain Dealer
Plans for a Better World.

(*Continued on page 36*)

The Original BucketruX

Trade DEMPSTER DUMPSTER Mark

Reg. No. 353486

Mfgd. by

DEMPSTER BROTHERS, Inc.

Knoxville, Tenn.

Pays You

TO HAVE SERVICING HANDLED IN DEALER'S SHOP!

Ample, comfortable service quarters, with all tools and parts handy, enable Allis-Chalmers factory-trained mechanics to quickly turn out highest-grade jobs.
Above — Rebuilding a stabilizer crank by welding.
• • •
Below — Machining the stabilizer crank to size after rebuilding. Example of what you can have done where the proper tools are handy!

Common sense tells you, you will get superior workmanship if your equipment servicing is handled under ideal conditions. That is why more and more equipment owners are hauling their units into Allis-Chalmers dealer shops for repairs, rebuilds, replacements. They are taking care of their hard-to-replace machinery... the best way... the shop way! Dealer mechanics, working in comfort, with proper illumination, the right-type tools and genuine parts... plus the expert help and advice of the shop foreman, can speedily turn out better jobs. Delicate Diesel parts are handled more carefully, too, in clean surroundings!

Next time your outfits need servicing... try this better, faster, shop plan. It will repay you many times over! Your machines will be back to work about as soon... will be ready to put in many extra hours of work with less down-time. Call your Allis-Chalmers dealer. Make arrangements to haul 'em in!

ALLIS-CHALMERS
TRACTOR DIVISION—MILWAUKEE, WIS., U. S. A.

To Allis-Chalmers... the Army-Navy "E", first such award for tractor production.

Building up a worn sheave groove by arc welding.

Wartime Repair Of Cable Sheaves

Grooves Made by Wire Rope May Be Rebuilt by Welding Or by Metal-Spraying

By F. L. SPANGLER, M.E.

✦ UNFORTUNATELY steel and iron sheaves wear just as quickly in wartime as they do in peacetime and, since they are not easily replaced these days, everyone must take all steps possible to make sheaves and drums last as long as possible.

Frequently old sheaves can be reclaimed and kept in use by building up the worn grooves. A common method is to deposit metal in the grooves by either arc welding or by metal-spraying. Where the sheave is badly worn, flat spots or places of uneven wear can be built up by welding and then the welding arc, or the metal-spraying gun, used to apply the final layer over the entire wearing surface.

The use of too soft a metal, such as cast iron, is often the cause of undue wear of sheaves. Soft sheave grooves built up with a hard metal have given as much as five times the original wear before further repairs were necessary. Hence, the reclaimed sheave might be a decided improvement over the new. This is proof that harder sheaves, such as manganese, might well be economical in the long run. A longer-wearing sheave saves more steel than is at once apparent, for in addition to saving precious sheave metal, it is much easier on the rope than is a sheave of softer material.

Wire rope in itself can be a needlessly destructive element to sheaves. Ropes that tend to twist as they pass over the sheaves cause far more rapid sheave-groove wear than where such twisting is absent. Because of the elimination of torsional stresses in preformed rope, this type of rope does not tend to twist or rotate in sheave grooves and thus reduces groove wear as well as rope wear.

Below we have tabulated approved methods of building up worn sheave grooves by arc welding and by metal-spraying, with the advantages and disadvantages of each process, so that our readers may study them and make their own decisions based on shop equipment.

Arc Welding

HOW TO APPLY

1: Use an electrode that is suitable for depositing on the particular metal of which the sheave is made, and where practical, select an electrode that will give a hard surface without heat treatment. With a steel sheave, use a manganese-steel electrode or a self-hardening electrode, deposited in a layer not more than 1/8 inch thick. Where the wear is greater, fill in with a carbon-steel electrode before depositing the final layer of hard metal.
2: Apply the metal by the skip weld method to minimize distortion.
3: Finally, true up the groove.

ADVANTAGES

1: Can be applied to sheaves having even or uneven wear.
2: Can be performed without removing the sheave, if necessary.
3: Many users of wire rope are equipped to build up sheaves by welding.
4: Deposit is very dense, contributing to long wear.

DISADVANTAGES

1: Arc weld deposits on cast iron sheaves will require heat treatment if hardness is desired. This is not true of steel sheaves.
2: The heat of welding tends to distort the sheave.

Metal-Spraying

HOW TO APPLY

1: If uneven wear is present, build up to uniform contour by welding or by truing up on lathe.
2: Prepare surface by blasting with sharp steel grit. After blasting, keep surface clean. Do not allow hands to come into contact with the surface.

Spraying molten metal onto the worn groove in a sheave mounted in a lathe.

3: Apply metal by rotating sheave in lathe with spray-gun attached to tool post. Use 1.2 carbon wire.

ADVANTAGES

1: Can be used to give hard surface to cast iron sheaves as well as steel sheaves.
2: Does not distort sheave if applied as directed above.
3: Requires no truing up of sheave groove after application.
4: Deposited metal is capable of absorbing rope lubricant, thereby retaining oil film on surface.
5: Wearability of hard deposit increases life of sheave and rope.

DISADVANTAGES

1: Very few users of wire rope have the equipment for metal-spraying and must rely on job metal-spray shops to do the work.
2: Since metal-spray is applied in a uniform layer, it is not suitable for building up worn spots or corrugations.

New A.I.S.C. Secretary

Roberts B. Thomas has been elected Secretary of the American Institute of Steel Construction, to succeed V. G. Iden who recently joined the staff of the Bureau of National Affairs in Washington. Mr. Thomas will continue as General Counsel of the Institute as well as assuming the position of Secretary, the duties of the two offices having been combined for the duration.

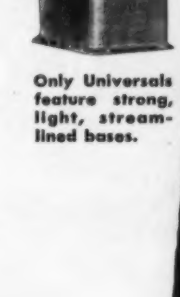
MARVEL

CONCRETE VIBRATORS ARE STILL AVAILABLE FOR WAR PROJECTS

Marvel Equipment Manufacturers, Inc.
224 So. Michigan Ave., Chicago, Ill.

The Care and Maintenance of Rock Crushers

No. 3 of a series of advertisements in the interests of national economy and to aid those users of crushing equipment unable to secure new units during the emergency.



Only Universals feature strong, light, streamlined bases.

The "Do and Don't" of Crusher Lubrication

Today lubrication is more important than ever before. Lack of grease can cause costly bearing failures and bearings are made of vital, much needed alloys.
These ten simple rules, strictly observed, will help your crusher to stay on the job until the day when parts are plentiful and new crushers obtainable.

1. Don't keep lubricant containers near crushing plant—as float dust is penetrating and a little grit in your grease may ruin a bearing.
2. Don't put oil or grease in bearings or fittings until they have been wiped off with clean rags. Flush them with a thin oil—don't use kerosene.
3. Use only clean containers.
4. Make it a practice to inspect bearings often—at least four times daily with bronze bearings; once daily with roller bearings—checking them for over-heating.
5. Don't use cheap lubricants—they cost more in the long run. Use only tested lubricants as indicated on name plate.
6. Place a burlap bag saturated with crank case drainings on top of the lower end of the toggle—it helps keep out dirt and lubricates the lower toggle seat.
7. Keep adjustment wedges and screws clean. Oil regularly to prevent rust. Unless already enclosed, wrap screws with cloth, tied on, to keep out grit.
8. Squirt out a shot of grease from gun before greasing to clean nozzle.
9. Don't over-oil or grease. Too much lubricant can overheat bearings. Bearings have to "breathe" but should be able to contact grease. Use thinner lubricant in cold weather. Notice oil level plugs or name plates indicating quantity to use.
10. Don't keep adding oil when it should be changed. Changing gets rid of any dangerous accumulation of dirt.

EVERYBODY EVERY PAYDAY AT LEAST 10%

UNIVERSAL ENGINEERING CORP., Formerly UNIVERSAL CRUSHER CO.
620 C Avenue West, Cedar Rapids, Iowa

We're 100% Ten Percenters!

UNIVERSAL

CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADEROLLERS, PORTABLE ASPHALT PLANTS

Ohio County Builds Army Access Roads

Important Military Posts And Factories Served by New or Widened Highways In Central Ohio

FRANKLIN County, Ohio, has served the needs of the Army, the Navy, the Air Corps and certain factories producing war materials by the construction of several miles of connecting roads to improve highway transportation to these war facilities. The county is square, with Columbus, the chief city of the county, the state capital and the leading industrial city of Central Ohio, located at the middle of the county. Some portions of these projects, notably grading, were undertaken with WPA forces, but the major portion of the work was completed under contract. The three projects described below were completed at a total cost of $625,000 with the funds being provided by the county and the Works Projects Administration.

Fifth Avenue Relocated

To serve an Army Depot and an airplane factory, a 2.29-mile dual highway project has been completed by a relocation of Fifth Avenue, Columbus. For a portion of this project a 60-foot right-of-way was acquired, while the balance is on a 100-foot right-of-way. The Ohio Department of Highways is now building an overpass at the intersection of this road with State Route 317.

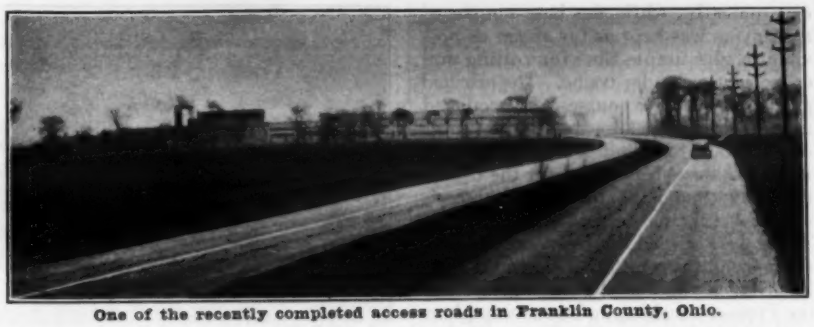
The section of this highway from James Road to the Administration Building at Port Columbus comprises two 24-foot bituminous roadways with a 2½-inch surface of asphaltic concrete over an 8-inch waterbound-macadam base laid in two 4-inch courses on a 2-inch insulation course of bank-run gravel. The two roadways are separated by a 16-foot parkway planted with grass and with no curbs.

The section west from James Road to Stelzer Road, where the state is now building the overpass, is a single 37-foot roadway which is to have a 4-foot medial strip with a concrete curb on both sides installed later. The pavement is the same as the section described above.

Road to Army Depot

From Main Street, Columbus, north to the entrance of an Army Depot, Franklin County has built 1.45 miles of concrete paving and 0.26-mile of surface-treated bituminous macadam. The concrete paving is 50 feet wide between raised curbs and consists of 12-foot 6-inch reinforced-concrete slabs of 9-7-7-9-inch cross-section tied to each other and with no medial strip. The surface-treated bituminous-macadam section, 0.26 mile long, is of the same construction as the section described below, running north from the Army Depot to Fifth Avenue.

The section of highway connecting the Depot with Fifth Avenue is 0.49 mile long. The work consisted of widening the existing 18-foot macadam base with bituminous concrete to a total width of 40 feet. The base for the widened section consists of 5 inches of compacted bank-run gravel topped with 3 inches of bituminous-macadam base and surfaced with a road-mix.



One of the recently completed access roads in Franklin County, Ohio.

Access Road to Air Base

Shook Road has been improved for 1.31 miles to serve the new Lockbourne Air Base. The existing pavement was 16 feet wide, composed of 8 inches of bituminous-treated surface on a base of traffic-bound gravel. This road was widened on one side to a total of 22 feet by a 6-inch base of bank-run gravel laid in two 3-inch courses with a 2½-inch base-widening course of asphaltic concrete surfaced with a 1½-inch asphaltic wearing course. Another section, 0.9 mile in length, south from the entrance of the Air Base was also surface-treated to complete this highway.

Personnel

Allan Slade is County Engineer of Franklin County, Ohio, with offices in a new field-stone office and garage building on Dublin Road, Columbus.

Illustrated Bulletin On Soil Stabilization

A thoroughly indexed bulletin on soil stabilization methods has been issued by Seaman Motors, 305 No. 25th St., Milwaukee, Wis., for the benefit of highway and airport engineers and officials who are vitally interested in this subject. We call attention particularly to the index as it covers all of the various subjects, from a general discussion of stabilization through soil-cement operations, the use of bitumens in stabilization, calcium chloride and Vinsol resin, then a series of useful hints which should be in anyone's files, and a final discussion of camouflage.

Copies of this well-illustrated Bulletin 22 in clear type will be sent promptly by Seaman Motors to readers of CONTRACTORS AND ENGINEERS MONTHLY on request. This review should be mentioned in writing.

Sluggers!
• No job is too tough for Clevelands! For these big, husky tools pack a mighty wallop—work at top speed—but take it easy on air consumption. Just what you need for every type of job—sinkers, wagon drills, paving breakers, clay and trench diggers, backfill tampers—and in the right sizes and styles. All the accessories, too—drill steel and rods, detachable bits, paving breaker chisels, air hose, valves and couplings. ★ Ask for the new Cleveland Catalog. Big and full of facts, it will help you in your work.
BRANCH OFFICES
Birmingham, Ala.
Berkeley, Calif.
Boston, Mass.
Buffalo, N. Y.
Butte, Mont.
Chicago, Ill.
Cincinnati, Ohio
Dallas, Texas
Detroit, Mich.
El Paso, Texas
Ironwood, Mich.
Knoxville, Tenn.
Lexington, Ky.
Los Angeles, Calif.
Milwaukee, Wis.
New York, N. Y.
Philadelphia, Pa.
Pittsburgh, Pa.
Richmond, Va.
Salt Lake City, Utah
St. Louis, Mo.
Victor, Colo.
Wallace, Idaho
Washington, D. C.
CANADIAN DISTRIBUTORS
Purves E. Ritchie & Son, Ltd., 658 Hornby Street, Vancouver, B. C.
Whiteball Machine & Tools, Ltd., Galt, Ontario
BUY U. S. WAR BONDS AND STAMPS
THE CLEVELAND ROCK DRILL COMPANY
Subsidiary of The Cleveland Pneumatic Tool Company
CABLE ADDRESS: "ROCKDRILL" • CLEVELAND, OHIO
LEADERS IN DRILLING EQUIPMENT

NEED A BIG Trailer?

La Crosse Makes Them Up To 200 Ton Capacity

•• WRITE OR WIRE ••

LA CROSSE TRAILER & EQUIPT. CO.
LA CROSSE, WISCONSIN U. S. A.

Handling Rock Cuts On Arizona SN Route

(*Continued from page 2*)

in that the cuts and fills balanced throughout with no waste and no borrow, but the contractor was allowed 6,000 yards of borrow to consolidate a large rock fill.

As an example of the character of the design and the daring that went into it to insure the best alignment, the road was originally designed to skirt a rocky crag on the outside, which would have meant a 10-degree curve. This design was changed on paper, computations started and it was found that the curve could be changed to a 6-degree swing by a heavy through cut instead of the side-hill cut that was originally planned.

The character of the ground precluded the use of wagon drills so that all the drilling was done by jackhammers. A stationary Ingersoll-Rand Imperial Type 10 compressor with a capacity of 535 cfs, driven by a D13,000 Caterpillar engine through a belt, was installed at a convenient spot where the most air would be required, near the heaviest rock cut. A 310-cfs I-R Type 20 portable compressor and a Worthington trailer-type compressor were also used. The number of jackhammers varied from 8 to 10 most of the time, although for short periods there were more. These jackhammers ran holes up to 32 feet deep, with the average 20 feet, using the H-type side-hole Timken detachable bits. The drillers were mostly Apache Indians so perhaps it is appropriate that the 60 per cent gelatine dynamite should have been Apache dynamite, fired by hand blasting machines after an Apache Indian powder monkey had loaded and tamped the holes.

The well-shattered rock was loaded by a Bucyrus-Erie 2-yard shovel into four 6-yard Hug rock trucks. The state specifications require 500 feet free haul, then for distances up to 1,500 feet the haul is on the basis of station-yards, and beyond that the cubic-yard-mile unit is used. The maximum haul on this job was about 1½ miles.

For the comparatively small amount of earth excavation, the contractor used a 14-cubic yard LeTourneau Carryall scraper pulled by a D8 tractor, a D8 with a LeTourneau bulldozer, and an Allis-Chalmers HD-10 with a Buckeye bulldozer.

The Oil Mat

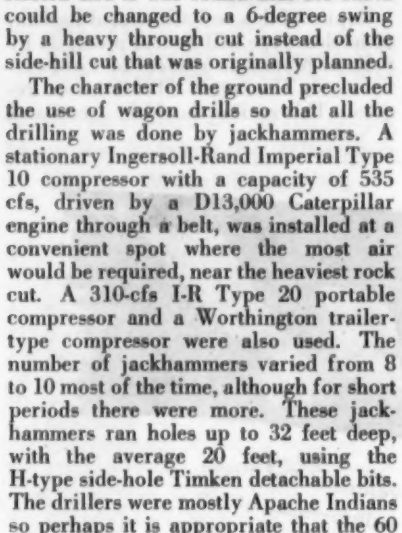
The oil-mat operation was done in units of from ½ to ¾ mile to give the maximum distance that could be worked economically, while the base course of two layers was kept as far ahead as possible to give ample time for rolling and consolidation under traffic. The crushed gravel for the base courses was produced at a crushing plant located at the center of the job. This plant produced the 2½-inch to 200-mesh material for the 6-inch base course and the 1-inch to 200-mesh material for the upper 3-inch course. These were spread the full 40-foot width of the roadway section. A fleet of 4-yard Ford trucks hauled the aggregate from the Pioneer crushing and screening plant to the road for spreading by the blades.

The oil mat, 40 feet wide and 2½ inches compacted, was road-mixed on the heavy crushed-gravel base, using "mineral aggregate" which was similar to the material used for the top section of the base, from 1-inch to 200-mesh screen sizes, well graded. This was spread at the rate of 57 tons per 100 linear feet of roadway close to the side of the road and bladed to a uniform windrow by the two No. 11 and one No. 12 Caterpillar power graders. When ready to start the road-mixing operation, the windrow was flattened to 20 feet wide at the side of the road to leave the balance of the highway for traffic. The flattened windrow was then shot with SC-4 in three to five shots, totaling 1.4 to 1.6 gallons per square yard. Each time a shot was completed by the contractor's 1,880-gallon Etnyre distributor on a Moreland chassis, the entire layer was turned over and then flattened again for the next shot of asphalt. No mixing was done until the full specified amount of asphalt had been shot on the windrow. The windrow was then turned from side to side of the road six or seven times by the three power graders which put it up

(*Concluded on next page*)

C. & E. M. Photo

A novel set-up on the roadside: an Ingersoll-Rand Type 10 Imperial compressor belt-driven by a Caterpillar D13,000 diesel engine, to supply the jackhammers in an adjacent cut.



The NITE-HAWK Gives You:

LIGHT—Where you want it—when you want it.

POWER—To operate hand tools—saws, drills, hammers, etc.

Floodlight and Searchlight Units up to 14 million candlepower.

Write for Bulletin 161

LISTER-BLACKSTONE, Inc.

1706 So. 58th Street MILWAUKEE, WIS.

A LINE OF "HUSKIES" ON HITLER'S TRAIL

"Somewhere in Africa" these and other long lines of Chevrolet trucks are moving forward with our fighting men in irresistible pursuit of the Axis. . . . And all over the embattled world Chevrolet-built airplane engines, anti-aircraft guns, armor-piercing shells and other war equipment are likewise serving side by side with our fighting men. . . . They're the world's best fighting men, and they deserve the world's best equipment—in a great, growing, inexhaustible stream—in *VOLUME FOR VICTORY!*

BUY WAR AND U.S. BONDS STAMPS

Chevrolet trucks on duty in the North African campaign.

CHEVROLET

DIVISION OF GENERAL MOTORS

BUILDING ARMS THE QUALITY WAY—*FOR QUALITY MEANS LIVES TODAY*

Oil-Mat Operations On Arizona Relocation

(*Continued from preceding page*)

into a windrow at the end of each circuit. A small amount of the mix was left on the surface to prevent picking up additional gravel from the base course. Upon completion of the mixing, the windrow was spread out in layers of about 1 inch loose thickness each until the laydown was completed.

The breakdown rolling started as soon as the final layer of the mix was spread by the graders. This was done by an 8-ton Buffalo-Springfield tandem roller followed by another Buffalo-Springfield 5-ton tandem for the finish rolling. The road surface was then left a minimum of 14 days under traffic for curing before the sealing was started.

On this project the entire job of sealing was left until the road-mix was complete from end to end so that the distributor and all equipment could be devoted to the one operation. The surface was thoroughly cleaned by a rotary broom, as well as by hand in bad spots, and then 0.5 gallon per square yard of slow-breaking asphalt was applied by the distributor and covered at once with ⅜-inch chips from a Buckeye chat spreader at 25 pounds per square yard. This application of asphalt will hold about 20 to 22 pounds so the excess was kicked off by traffic and broomed back by the rotary broom until no more would be taken up in the surface.

Personnel

This contract for the rock and earth excavation as well as the oil-mat surface was awarded to W. E. Orr, contractor, of Phoenix, Arizona, on his low bid of $245,317.11. The project was known as SN-FAP 16(4) 1942. The contractor acted as his own Superintendent for the work. For the Arizona Highway Department, the work was under the direction of R. C. Perkins, District Engineer, with C. B. Browning as Resident Engineer.

Rules on Recapping Truck or Car Tires

The Office of War Information has recently released a recapitulation of the eligibility rules governing the procurement of tires and recaps which have been set up by the Office of Price Administration. It pointed out that the desire to have car and truck owners recap their tires in time, so that a potentially recappable tire is not lost entirely, was the chief reason for freeing passenger car tire recapping from rationing restrictions. This step has been made possible by control of mileage of passenger cars through the gasoline rationing program.

Trucks and trailers included in the List A eligibility classification in OPA's regulations (those vehicles providing services deemed most essential by OPA) are eligible for new crude-rubber tires if their present casings can not be recapped. Trucks and trailers performing important services not on List A may apply for a certificate entitling them to recapping with "truck-type camel-back," which includes a certain amount of crude rubber. Truck tires cannot be made or recapped with reclaimed rubber only.

There is no restriction on the recapping of passenger-car tires with passenger-type camel-back. "Camel-back" is any rubber compound designed for application to a worn tire to make a new tread. Passenger-type camel-back is made of reclaimed rubber only, using no crude. All passenger cars are also eligible for some type of replacement tire, if their present tires are not recappable. The grade of tire for which a car is eligible depends upon the gas mileage allowed the particular vehicle. Thus, cars with mileage allowances up to 240 a month (A card) are entitled to Grade III tires, which are used or recapped tires. This is in addition to permission to recap the car's own tires. Cars with mileage allowances of from 240 to 560 miles a month (B card) are entitled to Grade II tires such as a new reclaimed-rubber tire or a pre-war tire priced at 85 per cent or less of the price of new-car equipment grade. Cars with mileage allowances of more than 560 miles a month (C card) can have a choice of any kind of new passenger tire.

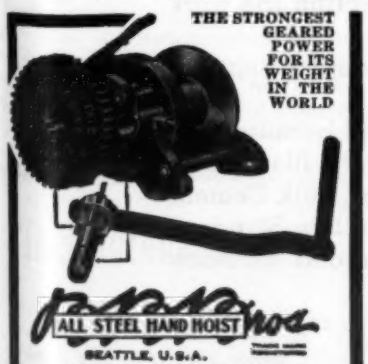
It is reported that facilities for recapping are good throughout the country, and that moulds and rubber are available.

New Welding Electrode

The new Tournaweld RW (Roller-Weld) electrode was specially developed by R. G. LeTourneau, Inc., Peoria, Ill., for use in building up track rollers, rails and other similar parts of machines subjected to a combination of impacts and heavy bearing wear. This new electrode is characterized by rapid burn-off, smooth operation, and uniform deposit of highly alloyed tough hard-surfacing metal which is sufficiently soft in the as-deposited condition to be ground according to the best practice employed in rebuilding track rollers.

Tournaweld RW operates with greatest efficiency on reverse polarity with a direct-current welding machine, the manufacturer states. The rod is black in color, 14 inches long, and is available in diameters of 5/32, 3/16 and ¼ inch.

Additional information on Tournaweld RW electrodes may be secured direct from the manufacturer.



COMPACT—POWERFUL—SAFE

"For use where power is not practical or available"

Manufactured in 2, 5 and 15-Ton Sizes. For capacity comparison, ½" cable used:

2-Ton	"Lightweight"	75 ft.
5-Ton	"General Utility"	250 ft.
15-Ton	Triple-Geared "Special"	1200 ft.

Patent instant gear change and positive internal brake that never fails, and will lock load. Price, f.o.b.

Gear Ratios	Weight	Seattle
2-Ton 4, & 22 to 1	60 lb.	$ 50
5-Ton 4, & 24 to 1	110 lb.	$ 75
15-Ton 4, 19 & 109 to 1	680 lb.	$250

BEEBE BROS.

3724 6th Ave., So., SEATTLE, WASH.

Warehouse stocks for dealers' Supply: Seattle—Chicago—Brooklyn—Houston. Complete Literature and List of Dealers in Principal U. S. Cities and Foreign Countries Gladly Mailed.

● Tap that reserve capacity of your excavator. Every extra yard that can be produced beyond normal expectation is an added contribution to victory on the production front.

Good planning and job organization of course are "musts." So is proper maintenance of your equipment. And, equally important, an experienced operator through skillful handling of his machine can save a minute here and a minute there which add up to a substantial yardage bonus at the end of the shift.

Perhaps these suggestions may help you to speed up your shovel's output:

Heap the dipper. Get a full load every pass. Heap every truck but don't overload.

●

Take a thin slice at a cut. Dipper will hoist through the bank faster and more easily than if you try for a deep cut. Take cut out in layers across face of bank.

●

Use two truck spotting wherever possible. Spot trucks in line with arc of swing and spot them the same distance from center of rotation.

●

Keep close to your digging — don't "stretch" to reach it. Spot trucks so as to dig and dump at same radius. Move up while waiting for trucks.

Work for smooth, well-balanced operation in a close tie-in with the flow of trucks. Steady operation is what breaks output records and gets out big yardage.

ARMY E NAVY

Bucyrus-Erie employees have accepted the award of the Army-Navy "E" as a challenge to keep production rising. * *

Bucyrus-Erie

SOUTH MILWAUKEE • WISCONSIN • U. S. A.

C. & E. M. Photo
A section of the stock room at the District 2 shops, Pine Bluff, Ark.

Arkansas Modernizes Garage in District 2

(*Continued from page 8*)

Grease and Sign Buildings

Grease storage and dispensing are handled in a small building 20 x 20 feet in the center of the yard where the small stocks of D-A lubricant and other heavy greases are stored for use as required. Adjacent to this house is an underground 1,000-gallon gasoline tank for refueling trucks from a gas pump next to the grease shed. Water and air connections are provided at the gas pump.

The sign building is a 20 x 38-foot structure in which sheet-metal signs are processed for service throughout the District. Much of the wood sign work is now carried on in this building. It contains a metal punch for placing reflectors in metal signs, a work room and store room. At one end is a concrete ramp so that trucks can back up to the floor level and be loaded easily.

Service Building

The service building is a 60 x 40-foot structure with three 20 x 40-foot stalls for various services. One is used for washing equipment and for removing paint from trucks and machines. It contains a Kerrick-Kleaner for this work and is equipped with folding doors. The center stall has a Globe Auto Hoist of 12-ton capacity for lifting equipment to be greased by the Alemite pneumatic grease guns. At the back is an Ingersoll-Rand two-cylinder garage compressor which furnishes the air for operating the auto lift and also air for all the uses throughout the yard.

The end stall is for spray-painting of machines and signs and has a complete DeVilbiss spray painting unit. A heavy-duty suction fan installed in the back wall provides adequate ventilation for the stall when painting is in full blast. This fan was first installed at the top of the wall in an existing window but proved to be inadequate, in spite of its power, to lift the heavy paint fumes from floor level and up to the exhaust level. The fan was moved to floor level and the window to the top position it formerly occupied and the fan has worked perfectly.

Storage Garage

At the back of the yard is the warehouse and storage garage measuring 100 x 60 feet and equipped with two 12 x 12-foot doors. This is the only building not finished with a concrete floor; it has a gravel floor because tractors are stored here along with trucks and other heavy machines. At the time we visited the District, several pick-up trucks were in storage, together with a Littleford distributor awaiting the "unfreezing" of asphalt, a Bros tank-car heater, and a large stock of calcium chloride.

A dark locked room at one end of the building is used for the storage of rubber tires and a few other items in which the District is slowly stocking its inventory.

Personnel

The facilities provided at the District 2 Maintenance Garage at Pine Bluff, Arkansas, are similar to those which should be provided also at any well-equipped county shop and garage. They are adequate for the service needed for the equipment used by the State Highway Department in the seven counties covered by the District, and at present lack only the personnel among the mechanics to provide complete service.

At the entrance to the yard is a large sign mounted on a heavy structural steel frame designating the District Garage and Office.

M. F. Hill is District Engineer for the Pine Bluff District No. 2 of the Arkansas State Highway Department. M. C. Methvin is State Maintenance Engineer.

By eliminating unnecessary frills in scores of articles from hairpins to motor trucks, the WPB in 1942 saved 600,000 tons of steel, 17,000 tons of copper, large quantities of other materials, and enough man-hours to build twenty-three Liberty ships, according to the Office of War Information.

ALL OVER THE WORLD
TORO
POWER MOWERS
TORO MANUFACTURING CORP'N.
MINNEAPOLIS, MINN.
MOWING MACHINERY SPECIALISTS FOR OVER 20 YEARS

In the conversion from peacetime construction programs thousands of experts, carefully selected from our nation-wide group of construction specialists, are now all over the world directing the work of America's construction battalions.

These picked men are building airports, roads, depots—springboards to victory.

Tremendous tasks are being done at military speed because they are working with familiar tools—*picked equipment*—Blaw-Knox Finishing Machines, Concrete Spreaders, Road Forms, Bulk Cement Plants, Batcherplants, Clamshell Buckets, Tamping Rollers, Standard Steel Buildings—equipment which is built to work around the clock and to come through in a pinch.

When victory is won, these men will return home to resume their places in the big post-war construction program.

In the meantime, let's wish them luck. They can be sure that Blaw-Knox will continue to extend all possible help and support.

BLAW-KNOX
BLAW-KNOX DIVISION
OF BLAW-KNOX COMPANY
2067 Farmers Bank Bldg., Pittsburgh, Pa.
NEW YORK • CHICAGO • PHILADELPHIA
BIRMINGHAM • WASHINGTON
Representatives in Principal Cities

★ ★ ★ ★ FOR VICTORY BUY U. S. WAR BONDS AND STAMPS ★ ★ ★ ★

A Report by PRA On Alcan Highway

Work of PRA and Their Contractors on Route To Alaska Discussed in Paper by MacDonald

+ THE construction activities of the Public Roads Administration and their contractors working in conjunction with the Corps of Engineers, U.S. Army, on the Canadian-Alaska Military Highway were discussed in a paper presented before the Nineteenth Annual Meeting of the American Society of Civil Engineers by Thomas H. MacDonald, Commissioner of Public Roads, L. I. Hewes, Chief, Western Region, PRA, and J. S. Bright, Alaska Highway District, Public Roads Administration.

This paper was in the nature of a progress report covering the two distinct phases of construction operations by the PRA in 1942. The main route of the Alcan Highway was determined by the existing line of airports in Canada and Alaska which are located away from the unfavorable weather areas of the continental mountain ranges nearer the Pacific Coast. With distances of from 250 to 350 miles between major control airports and almost totally unknown terrain, the first task was to reconnoiter the snow-covered territory, which was done jointly by Army and PRA engineers. This work began early in March, 1942, and proceeded by airplane, dog train and other ground parties. MacDonald reported that available maps were sketchy, lakes were out of position and critical elevations almost wholly useless. Indicated mountain passes in one area proved to be in error as much as 3,000 feet and the indicated courses of many considerable rivers were largely schematic. However, once the main features of the land began to take form there was a corresponding degree of freedom of choice in this wilderness location, as right-of-way was not a problem.

While reconnaissance proceeded with temperatures still as low as 35 degrees below zero, Army Engineer regiments moved into position at control points, and simultaneously the Public Roads Administration began to assemble its engineers and available construction contractors. Ultimately 823 Government employees, including accountants, purchasing agents and others, were regularly assigned to the work, and at one period the number was 1,118. This list included U. S. Public Health Service men who took over the important responsibility of health and sanitation.

A canvass of contractors interested in the Alaska Highway showed a lack of equipment in the control of any one or any small number of available contractors. It was therefore decided to engage the services of management contractors who would recruit contractors to sign construction contracts with the Government. The four management contractors engaged were instructed to recruit contractors on a cost-plus-a-fixed-fee basis, and a total of 47 such contractors were engaged. One Canadian management contractor was engaged and 10 Canadian construction contractors immediately began grading the most southerly 48-mile section between Dawson Creek and Fort St. John, where existing local roads made accessible points on the revised alignment which was immediately staked out for grading. Another management contractor with 14 Iowa contractors undertook all the work in Alaska, with many of their 1,400 men being flown in by the Ferry Command. Another management contractor from St. Paul took the 256-mile section from Fort St. John north to Fort Nelson; from that point to Watson Lake, a distance of 360 miles, the work was assigned to the contractors of the Canadian management contractor; and a Seattle contractor took a large part of the 600-mile section between Watson Lake and the Alaska-Canadian boundary line.

Dawson Creek, railhead of the Northern Alberta Railway, where equipment for use on the Alcan Highway started its difficult journey to the site of the work.

The job of spotting these contractors along these wilderness miles and moving in their equipment was a very difficult one under the best conditions, and in this operation it was expected that the Army pioneer road would be helpful. Under the urgency of war conditions, the operation assumed formidable aspects. However, before the season was over, the various contractors had an aggregate of approximately 7,500 men, all of whom had to be housed and fed, and their equipment supplied with gasoline, fuel oil and lubricants. During a period of

(*Continued on page 40*)

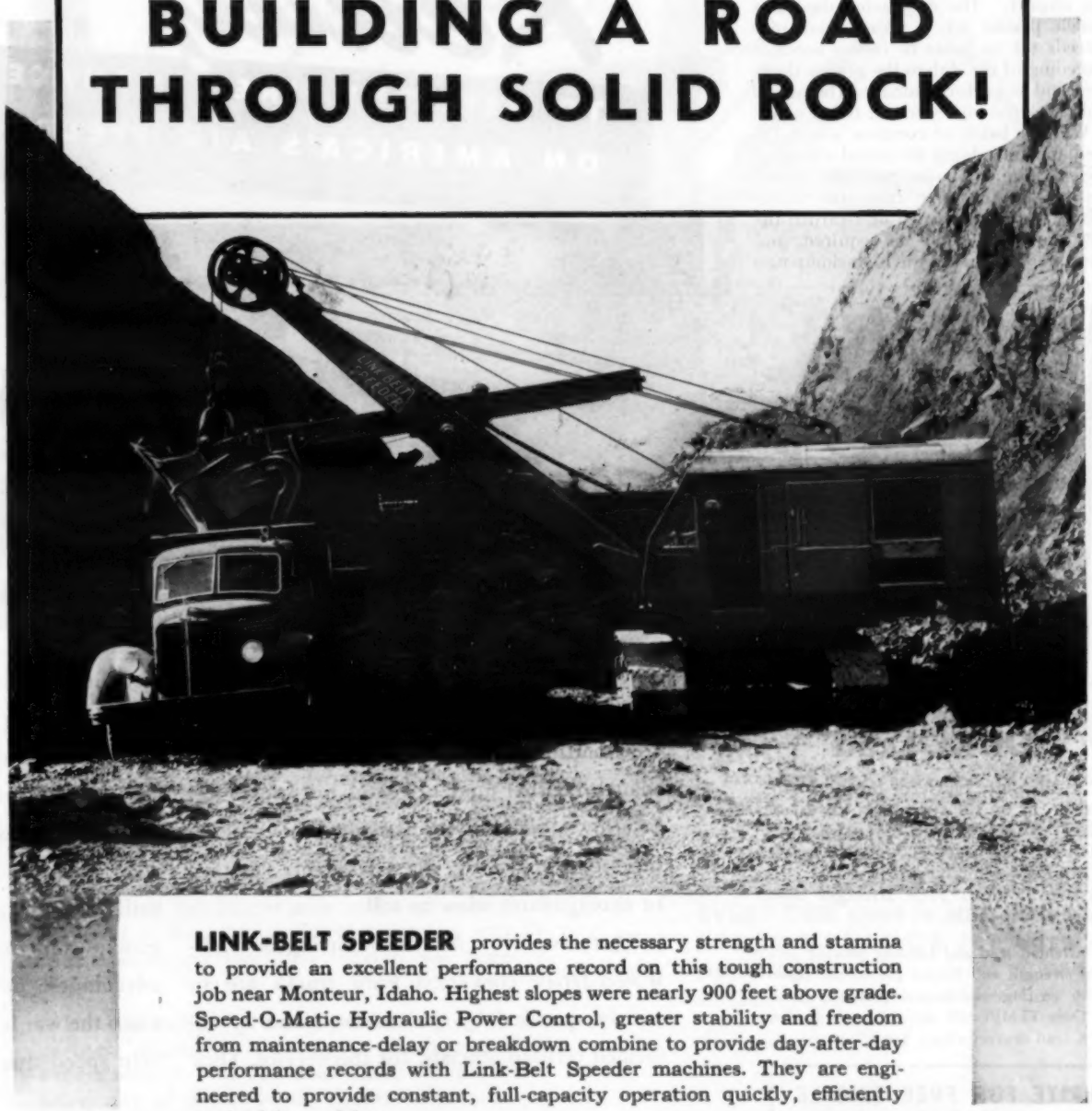
"Incomprehensible?"

It's astounding how we get along without many things heretofore considered necessary. The reason is simple—we use the essentials—among which are "FLEX-PLANE" joint-installing and finishing machine equipment.

Steel and powder backed by BONDS will win war.

FLEXIBLE ROAD JOINT MACHINE COMPANY
Warren, Ohio, U.S.A.

BUILDING A ROAD THROUGH SOLID ROCK!



LINK-BELT SPEEDER provides the necessary strength and stamina to provide an excellent performance record on this tough construction job near Monteur, Idaho. Highest slopes were nearly 900 feet above grade. Speed-O-Matic Hydraulic Power Control, greater stability and freedom from maintenance-delay or breakdown combine to provide day-after-day performance records with Link-Belt Speeder machines. They are engineered to provide constant, full-capacity operation quickly, efficiently and without delay.

0021

LINK-BELT SPEEDER

BUILDERS OF THE MOST COMPLETE LINE OF SHOVELS—CRANES—DRAGLINES

LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO, ILL.
(A DIVISION OF LINK-BELT COMPANY)

Truck-Mixed Concrete For Hangar Floor Slab

Steel for Hangars Shifted To Other War Activities; Wood Used Instead; Floors Were Hand-Finished

✦ WITH a rapid expansion in the plans for the number of airplanes and gliders to be used at a mid-west airport, the hangar program could not keep up. The service hangar was built of steel, but such storage hangars as could be built had to be constructed with wood trusses, using Teco connectors for strength, as priorities moved the required steel to other war activities.

The small hangars measure 122 feet 3½ inches x 80 feet 2 inches and are paved with 6 inches of concrete carefully finished to insure uniform flow to the floor drains. Four 61 x 32-foot slabs were poured as units and then the odd rectangle poured separately.

Careful Screeding

Ready-mixed concrete was delivered by a commercial producer in Smith 2¼-yard truck mixers as required and on schedule from a plant about a mile from the airport. The contractor used 2 x 6-inch planks set to grade and pipe screeds set on posts to insure accurate screeding of the slab to the proper thickness and slope for drainage. The screed stakes for the pipe were set 6 feet apart.

When a batch of concrete was delivered, the crew doing the initial screeding hopped into action, the gate man started the flow of concrete from the truck-mixer, two men speeded or retarded the flow down the chute as required, and four puddlers spread the high-slump mix over the area being paved. One screed man, with a helper using a shovel to fill in or pull out excess concrete, struck off the batches rapidly while one finisher started the "finishing touches". The actual finishing operations were done by a crew of eight finishers working in relays of four each and operating their steel hand floats while kneeling on a pair of wood pads, one for their knees and the other for their toes. A waterproof membrane seal was applied for curing by spraying the surface of the finished concrete with Aquastatic curing compound.

Personnel

The actual production of finished floor varied with the accessibility of the hangar for delivery of the concrete, as the finishers worked at a uniform pace. The work varied from finishing 250 to 280 cubic yards of concrete in place per 10-hour day. The work was done by contract under the direction of the U. S. Engineer Department.

In the interest of national security, mention of the location of and personnel connected with U. S. Army construction is omitted.

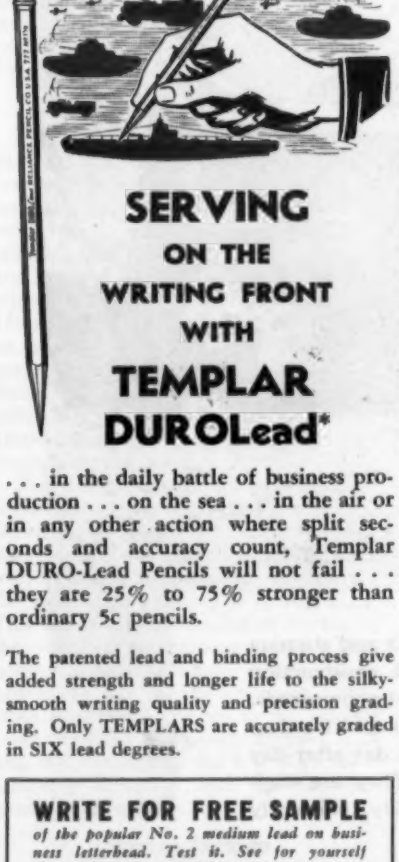
Mexico Adds Link to Inter-American Route

Overland communications by highway to Central America are scheduled to be extended soon with the completion of an additional 340-mile stretch of the Inter-American Highway from Mexico City south to Oaxaca. The completion of this new section will mark an important advance in Mexico's rapidly expanding highway system and adds another vital link in the 15,000-mile Pan American Highway, now complete in large part.

The northern section of this great international transport route, the 760-mile highway from Laredo, Texas, on the U. S.-Mexico border, south to Mexico City, has been in use for several years. With the completion of the road from Mexico City to Oaxaca, a gap of only 600 miles will remain within Mexican territory, within which section 150 miles of highway is already built.

Rapid progress is also being made on Mexico's second great national highway, from Juarez in the north, opposite El Paso, Texas, to Mexico City, a distance of approximately 1,376 miles. This new highway, almost twice as long as the present road from Laredo to Mexico City, will give Mexico's capital direct access to the markets of Texas and California and the western section of the United States. Over 200 miles of this road is finished and in use, and 4,000,000 pesos have been set aside for the work.

The 328-mile trunk highway from Mexico City and Tuxpan on the Gulf of Mexico and the 341-mile road from Mexico City via Nautla to Poza Rica also are being pushed as basic parts of the national highway system.



. . . in the daily battle of business production . . . on the sea . . . in the air or in any other action where split seconds and accuracy count, Templar DURO-Lead Pencils will not fail . . . they are 25% to 75% stronger than ordinary 5c pencils.

The patented lead and binding process give added strength and longer life to the silky-smooth writing quality and precision grading. Only TEMPLARS are accurately graded in SIX lead degrees.

WRITE FOR FREE SAMPLE
of the popular No. 2 medium lead on business letterhead. Test it. See for yourself that TEMPLAR DUROLead is almost unbreakable.

RELIANCE PENCIL CORP.
Manufacturers of Pencils for all purposes.
Dept. "A8" Mount Vernon New York
**Trade mark and patent number 2,131,657 of M. A. Forst Ltd. Reliance Pencil Corporation Licensee.*

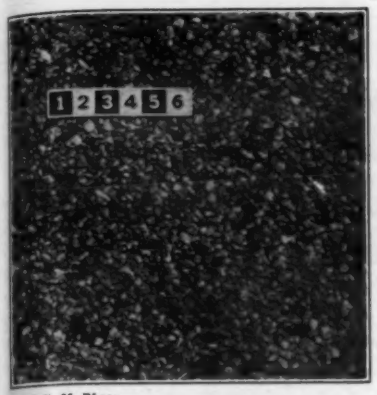
Templar DURO Lead PENCILS

Ability to travel fast over any kind of terrain is the first qualification for an airport fire truck. Minutes may save precious lives and planes. Neither mud, nor sand, nor snow must be allowed to delay the arrival of the truck, at the scene of action, when accident, sabotage or enemy bomb takes its toll.

That is why Marmon-Herrington *All-Wheel-Drive* converted Ford trucks are so widely specified by the military, and by informed civilian officials, for this service. They get through, where conventional drive trucks fail, and being the speediest, most maneuverable all wheel drive trucks on the market, *they get through fast.*

Users of these vehicles, in the oil fields, in road building and maintenance, in public utility services, logging camps, mining and general construction, etc., will find still greater advantages in Marmon-Herrington trucks when the war is won. Let your bond purchases help speed that day!

MARMON-HERRINGTON
All-Wheel-Drive
MARMON-HERRINGTON CO., Inc., INDIANAPOLIS, INDIANA
Cable Address: MARTON



C. & E. M. Photo

Surface texture of the ½-inch crushed-stone chip seal on the Fort F. E. Warren Road, Cheyenne, Wyo. The scale is in square inches.

Wyoming Access Road For QM Corps Center

(*Continued from page* 11)

leaving the too-well-known hedge row on the outside of the fence.

The harrowing mentioned above has other features of value in the development of the highway. The furrows act as catchment ridges for the snow during the first winter before the ground cover has had a chance to develop, and the moisture is conserved in the furrows which are virtually contour plowings in multiple. Thus again we are glad to point out the carrying over into the highway field of the excellent work of the Soil Conservation Service under the direction of Dr. H. H. Bennett in conserving the soils along our roads and on our farms by contour plowing to prevent erosion and to conserve the moisture in those parts where it is not abundant.

The single bridge on this project is a timber structure of creosoted piles and lumber, using an untreated 4 x 12-inch plank as a guard rail instead of the usual metal guard rail used in Wyoming. This plank is painted white to make it stand out against the creosoted structure and the 8 x 8-inch creosoted hub guard is held firmly to the floor by lag screws and ¾ x 41-inch bolts through stringers.

Personnel

The contract for the construction of this access road was awarded to H. W. Read, contractor, of Cheyenne, Wyo., on his low bid of $94,823.55. During the active work on the contract Milo Cook was Superintendent for the contractor on grading and gravel surfacing and Orris Chamberlain on oiling and seal coating. The work was done under the direction of the Wyoming State Highway Department, Frank Kelso, Superintendent, with J. E. Lloyd as Project Engineer in charge of grading operations and Fred Seward, Project Engineer on gravel surfacing, oil-mat, chip seal and bridge work.

Army-Navy "E" Awards

Several more Army-Navy "E" Awards have been made in this field for high achievement in the production of war materials. The Koroseal plants of the B. F. Goodrich Co., located in Niagara Falls, N. Y., and in Louisville, Ky., received Awards on March 2 and 10, respectively, and the Construction Divisions of the E. I. du Pont de Nemours & Co. who built the Wabash River Ordnance Works and the Chickasaw Ordnance Works were awarded "E's" on March 3 and March 5. These latter Awards marked the twentieth and twenty-first such awards made to plants owned or operated for the government by the du Pont organization.

Vital Military Roads Rushed to Completion

Working night and day, the Public Roads Administration met the Army's schedule for completion of two highways of great importance to the defense of the Panama Canal, according to the PRA's report on work done in 1942. Soon after war was declared, the Army demanded that the Trans-Isthmian Highway and the Chorrera-Rio Hato Highway, a section of the Inter-American Highway giving access to important air defenses for the Canal, be made available for military use by June, 1942.

The job of placing more than 50 miles of concrete pavement through the hills and jungles of Panama in six months was a big one, complicated by distance from supplies of machinery, repair parts, and sources of experienced workmen. PRA engineers organized for maximum production of all machinery, and by the end of January, 1942, it seemed that they would reach the goal assigned them. However, plans were nearly upset by the wettest "dry season" in 20 years. Torrential rains caused many delays in February, March and April.

Major construction in Panama generally stops with the beginning of the rainy season in May. In the summer of 1942, however, work was pushed in spite of the rains, which amounted to nearly 3 inches in one 2-hour period, and now both roads are surfaced and ready for military use, although some minor work remains to be done.

The Trans-Isthmian project runs from Colon, on the Atlantic side of the Isthmus, to Madden Dam from which an existing road connects with Panama City at the Pacific entrance to the Canal. The Chorrera-Rio Hato Road, projected originally as a section of the Inter-American Highway, extends 52 miles to an important military airfield. Construction was begun in cooperation with the Republic of Panama, under the direction of PRA engineers. About half of the 52 miles had been surfaced, when the United States agreed to complete the highway without cost to Panama. All available machinery was concentrated on the project, and surfacing was completed July 1, 1942.

The two projects embrace 76 miles of concrete pavement, 42 bridges, and required exceptionally heavy grading, the PRA reports. Work is now under way on a new road to replace the existing highway between Madden Dam and Panama City.

Idle equipment helps the Axis! Find a use for it or scrap it!

COMPLETE
WELL POINT SYSTEMS
WILL DRY UP ANY EXCAVATION
Faster—More Economically
Write for Job Estimate and Literature
COMPLETE
MACHINERY & EQUIPMENT CO., Inc.
Dept. C
38-40 11th St., Long Island City, N.Y.
Tel. IRonsides 6-8600

Lightweight

*means greater "digability"

You automatically step-up the "*digability*" of your dragline when you hook up a Hendrix *Lightweight* Bucket! With the advantage of being from 20% to 40% lighter than other buckets, type for type, you can use a larger bucket than that for which your machine was designed and yet maintain the allowable loaded weight. By the same token, you'll get bigger pay loads on operations requiring a long boom. In wet digging you increase your pay loads by leaving the water in the pit.

Hendrix Buckets are *engineered* to provide this greater "*digability*" through the elimination of all excess weight. This has been done without sacrificing any of the strength, durability and toughness so necessary in a dragline bucket. We took the load *out of the bucket* . . . to let you put it *inside!* Write for descriptive literature, or *ask your dealer.*

1. ALL WELDED CONSTRUCTION—*no rivets*
2. 10% to 14% MANGANESE STEEL CHAINS and FITTINGS
3. 20% to 40% LIGHTER THAN OTHER BUCKETS, *type for type*
4. GETS FULL LOAD PAY MATERIAL EVERY TRIP *even in wet digging*
5. PERFECT BALANCE *for ease of handling*

Three Types—Light, Medium and Heavy Duty
¾ yd. to 20 yd.
Also available ***without*** *perforations*

THROW YOUR SCRAP INTO THE FIGHT!

HENDRIX
Lightweight DRAGLINE BUCKETS

DESOTO FOUNDRY, INC. · MANSFIELD, LOUISIANA

Kansas Relief Route From Topeka to West

Increasing Heavy Traffic On U. S. 40 Led to Project North of Alma Now Stopped Despite War Need

✦ EARLY in 1941, plans were completed for the reconstruction of Kansas Highway 10, largely on new location, to relieve the great pressure of traffic on U. S. 40. Since work started, the need for the relief highway has become much greater with the closing of a portion of U. S. 40, where it passes through a military reservation, necessitating a lengthy detour. The paradox of increased need for the route because of war activities and the stopping of the project north of Alma where it intersects State Highway 99 for the same reasons is not uncommon today in many fields of non-military construction.

The present 6.497-mile project, SN-FAP-392-F(1), when completed, will furnish a 22-foot roadway on a 24-foot base of selected material 15 inches thick to insure protection from the heavy clays of the subgrade. Originally the pavement was to have been a 22-foot concrete slab, but this has been changed to a light gravel surface to hold the grade for local traffic. Difficulty in achieving adequate progress in the grading operations has been chiefly due to the demands of nearby war construction projects.

The contracts for the project included grading, a 388-foot bridge over Mill Creek and an overpass 328 feet long nearby crossing the main line of the Rock Island Railroad, a 115-foot bridge over Pretty Creek, one 169 feet long over Paw Paw Creek, a 115-foot structure over Spring Creek, and a 193-foot overpass over a branch of the Rock Island Railroad.

Grading Contract

The grading contract was awarded to George Bennett Construction Co. of Kansas City, Kansas, for the following quantities:

Excavation, rock	170,056 cubic yards
Excavation, common	496,078 cubic yards
Rolling and tamping rock fills	534,042 cubic yards
Compaction, Type C, on selected borrow and all-earth fills	107,123 cubic yards

Where the new road runs over the same line as the old, the area on either side of the old narrow road was cored out, ready to be backfilled with selected material. Under the delays that have occurred on the work, this situation turned out to be most unfortunate as the excavated areas became wet under the continued heavy summer rains, and the heavy clays that were to be covered with the selected borrow became impassable. The completion of the selected borrow was therefore hastened during the latter part of the summer so that there would be no difficulties during the winter before the grade could be completed and a light gravel surface spread.

A large portion of the excavation was done by LeTourneau scrapers pulled by D8 tractors but the heavy shale was too much for a ripper to tackle so dynamite was resorted to for the harder rock and the thickest layers of shale. A 40 per cent dynamite was used with the holes running from 1 to 4 feet in depth.

Bridges and Overpasses

The first bridge from the east end of the project is the Mill Creek Bridge, followed immediately by an overpass above the Rock Island Railroad. These were originally designed as a continuous-deck plate-girder structure and an I-beam structure respectively. Because of the steel situation, they were changed to reinforced-concrete, thus greatly reducing the amount of steel required, but lack of skilled workmen in the vicinity further delayed construction.

Mill Creek Bridge as redesigned is 388 feet long and required the following quantities for its completion under the revised design which eliminated the need for 341,140 pounds of structural steel but increased the amount of reinforcing steel needed from 102,030 pounds to 219,070 pounds.

C. & E. M. Photo

Partially completed grading on Kansas Highway 10. In the foreground is a culvert to be covered by a high fill, and beyond the sidehill cut is the site of Mill Creek Bridge and the Rock Island overpass.

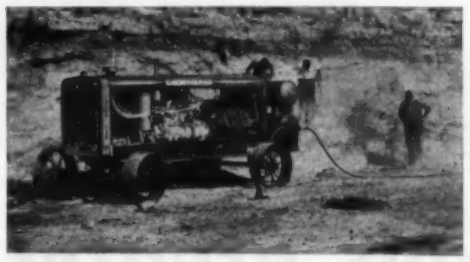
Excavation	1,120 cubic yards
Concrete	995 cubic yards
Reinforcing steel	219,070 pounds
Bearing devices	2,350 pounds
Steel piles, H-beams, 10-inch, 42-pound	866 linear feet

Contracts for the railroad overpass

(*Concluded on page 53*)

Neither Heat Nor Cold · · ·

Neither heat nor cold—nor severe weather conditions—nor extremes of altitude make any difference in the dependability of Gardner-Denver Water-Cooled Portables. They keep on delivering full air output day after day, month after month. Cutaway view of water jacket completely surrounding cylinder and head shows why.



Blistering Summer Throughout the "Death Valley" days of summer, your Gardner-Denver Water-Cooled Portable Compressor will show lower discharge temperatures from both the low and high pressure cylinders, as well as from the air receiver. (Here a Gardner-Denver Diesel Portable supplies air for powerful Gardner-Denver S-55 Sinkers.)

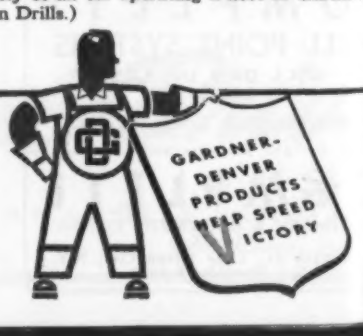
Frigid Winter In severely cold weather, warm water from the engine may be circulated through the compressor jacket, thoroughly warming the compressor before the clutch is thrown in. With the compressor "warmed up," oil will flow to the vital parts at once. (Note the heavy-duty Gardner-Denver S-73 Sinker.)

High Altitude Whether your job calls for operating at high altitudes or low—you'll find your Gardner-Denver Water-Cooled Portable Air Compressor delivering the same dependable performance. You'll find they run cooler at any altitude—and use less lubricating oil. (The sinking drill is the famous Gardner-Denver S-55.)

Grueling Service When the job calls for three-shift-a-day operation, you'll learn how a Gardner-Denver Water-Cooled Portable Compressor will deliver full air output through the hours—without coddling or pampering. (On this project, Gardner-Denver Portables furnish plenty of air for operating a fleet of Gardner-Denver UM-99 Wagon Drills.)

For a bulletin describing the full line of Gardner-Denver Water-Cooled Portable Compressors, write Gardner-Denver Company, Quincy, Illinois.

GARDNER-DENVER *Since 1859*



Carey Elastite EXPANSION JOINT
Standard in Concrete Construction for 31 Years
ECONOMICAL and EFFICIENT
Asphalt Joint
Fiber Joint
Sub-Grade Felt
THE PHILIP CAREY MFG. CO.
Dependable Products Since 1873
LOCKLAND, CINCINNATI, OHIO

This small scraper, easily attached to a tractor, is a versatile unit designed for a variety of emergency dirt-moving jobs.

New Small Scraper For Dirt-Moving Jobs

The Huber Speed Scoop, made by the Huber Mfg. Co., Marion, Ohio, is designed for use on small dirt-moving jobs or for emergencies. It is being used in many parts of the world for repairing bombed runways at landing fields and for quickly repairing highways affected by bombing attacks.

The Speed Scoop is brought into action in a moment's time merely by attaching to a tractor. Loading is accomplished by an easy rolling movement of the earth which reduces drawbar pull, the manufacturer states. A simple hydraulic cylinder controls the scoop and its blade adjustment to the earth. The hydraulic ram action makes it possible to dump the dirt in one pile or spread it to any desired thickness. Backfilling, shoulder operations, or dumping in odd corners or over embankments can be done accurately, it is reported.

Further information on the Huber Speed Scoop, which is built in two sizes for operation with 20 to 30-hp tractors or 35 to 50-hp tractors, may be secured by interested contractors and engineers direct from the manufacturer. Just mention this item.

New Additive for Cement Disper n

Any technique which improv ne dispersion of cement particles in a portland-cement mix automatically permits reduction of the water ratio and improves the compressive strength characteristics of the concrete. Santorized Trimix, made by L. Sonneborn Sons, Inc., 88 Lexington Ave., New York City, is designed to achieve both of these results, due to the application of the principle of greater wetting by means of additives having great surface activity. These results are secured without interfering in any way with the normal hydration cycle of portland cement.

The advantages claimed for this method are the reduction of up to 20 per cent of the normal volume of the gauging water, and greater workability of the mortar. Slump tests show that when Santorized Trimix is added to the gauging water in proper proportions, the slump of a normal 1:2 mix ranges from 6 to 7 inches, as compared to 2½ inches with the same amount of plain gauging water. Higher strength is obtained when Santorized Trimix is used because the method imprisons the gauging water used. This lowers evaporation, resulting in more thorough curing. It is stated that greater homogeneity is also obtained, because the addition of Santorized Trimix tends to eliminate the tendency of water to segregate from the cement and aggregate particles. In addition, it produces concrete and mortar of greater water tightness, durability and with less shrinkage.

Further details on Santorized Trimix and its use in portland-cement mixes may be secured direct from the manufacturer by referring to this item.

New ¼-Inch Drill For Steel or Wood

Announcement has just been made by Skilsaw, Inc., 4769 Winnemac Ave., Chicago, Ill., of a new Model 47 Skildrill. Although designed especially to speed up tough "skin drilling" in airplane construction, this new drill is suitable for many other types of drilling jobs up to ¼ inch in steel and ½ inch in wood.

Like the Model 45 Skildrill, of which many thousands are in use, the new Model 47 is small, light and compact, but it has even greater power for tough jobs and greater drilling speed under load. It weighs only 3½ pounds, is 7¼ inches long, and $2\frac{9}{16}$ inches wide. It fits in anywhere a fist will. Among the features mentioned by the manufacturer are its die-cast body, helical-cut gears, and 100 per cent anti-friction bearings for smooth quiet performance; an extra-powerful universal motor available in four speeds to fit every drilling job; and two-pole momentary contact switch with lock for continuous operation.

Further details on this new Skildrill may be secured direct from the manufacturer by referring to this descriptive text.

AMERICAN DeLuxe Concrete WHEELBARROWS
With Steel Wheel
for WAR ORDERS

Write for Bulletin

American No. 1—4 cu. ft. struck capacity DeLuxe Concrete Wheelbarrow with steel wheel.

Code with steel wheel.....PERFECT-S

THE AMERICAN STEEL SCRAPER CO., SIDNEY, OHIO

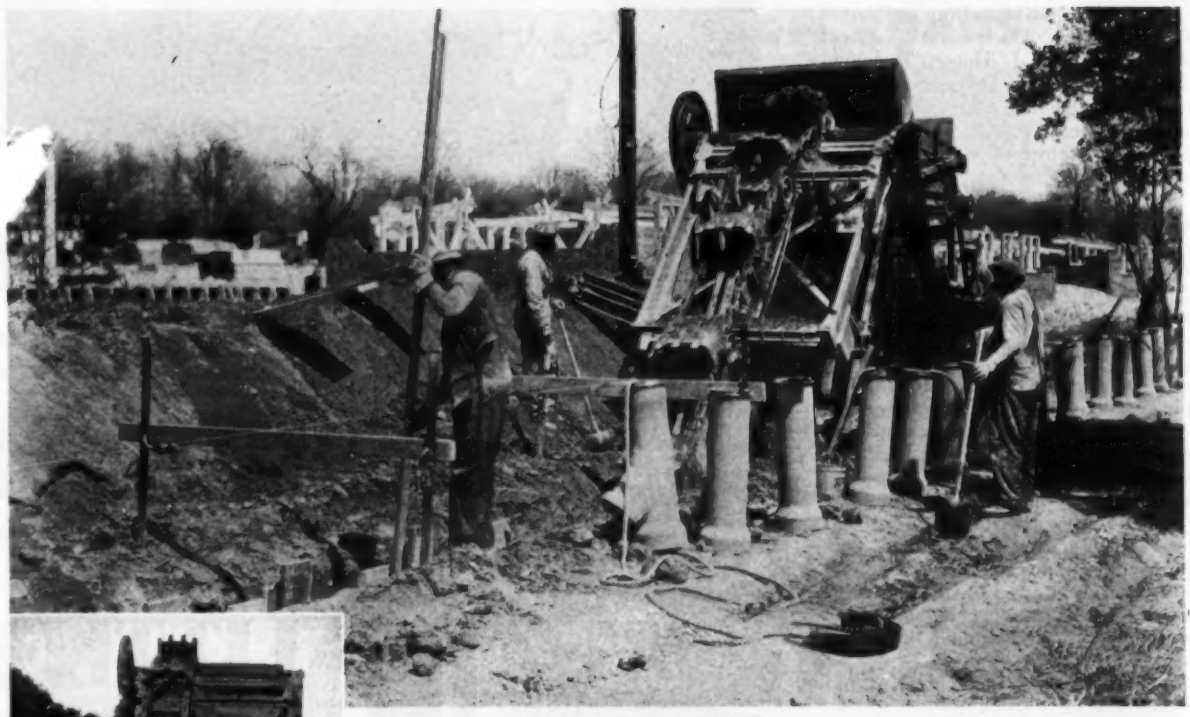
SAND'S-STEVENS
Line & Surface LEVEL

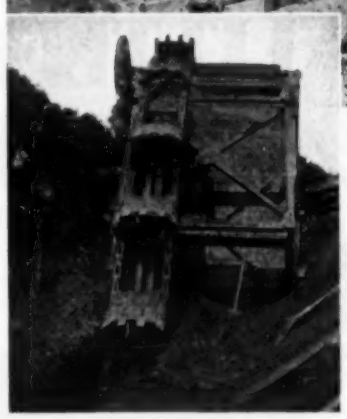
Endorsed and Adopted by Road Builders and Contractors

Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy guaranteed.

SAND'S LEVEL & TOOL CO.
8831 Gratiot Ave. Detroit, Mich.

PARSONS





Parsons Trencher cutting ditch between pavement edge and steep bank. Only an offset boom could work in these restricted quarters successfully.

TRENCHERS Set Pace for Housing Projects

Parsons' speed and dependability made them first in the field when cantonments, airports and ordnance plants were constructed. And now Parsons Trenchers continue to set the pace in housing jobs throughout the country. Sewer, water, gas and electrical distribution systems must be completed first before homes can be built. Only because these machines are compactly built with alloy steels, anti-friction bearings and enclosed hardened gearing can uninterrupted, profitable operation continue. The original Parsons' patent — Offset Boom — permits excavations in narrow alleys or on road shoulders, making trenching possibilities unlimited. Speed and profit are easily available on housing projects with a Parsons Trencher.

SEE YOUR NEAREST DEALER TODAY.

THE PARSONS COMPANY · NEWTON, IOWA

TRENCHING EQUIPMENT

Handle Explosives Wisely and Safely

Proper Care in Handling Explosives and Preparing For Blasts Will Prevent Accidents on the Job

✦ ACCIDENTS in hazardous jobs are likely to be caused by two types of persons: the green inexperienced worker who through ignorance or bravado may cause injury to himself and to others; or the "old-timer" at the job who has become hardened to its hazards, due to the familiarity that breeds contempt.

In these days of a serious manpower shortage, every accident which causes fatalities, injuries and lost time is helping the enemy. To save manpower for the war effort, the National Safety Council is carrying on an intensive safety campaign in which every person in the country should participate.

In the construction industry, one of the most hazardous jobs is the handling of explosives. At the present time, with new inexperienced men on every job, with speed the watchword for every project, it is well to recall the fundamental principles of handling explosives safely. At the Thirty-First National Safety Congress, E. L. Thayer, Technical Division, Explosives Department, E. I. du Pont de Nemours & Co., presented a comprehensive practical paper on the subject of explosives which we have abstracted below.

The user of explosives must prepare for their safe handling before they arrive on his property. Properly located and constructed magazines must be provided and, of course, blasting caps and dynamite must not be stored together. In fact, these two materials should be kept apart just as long as possible. Care should be exercised in transferring the explosives from the freight car or the manufacturer's truck to the consumer's magazine. The boxes should be lifted and carried, not thrown, and should be placed carefully in neat piles. Arrangements should be made to insure that old stocks are used first, as dynamite may deteriorate on storage. Of course, no one should be allowed to open cases of dynamite in a magazine, and good housekeeping both in and around the magazines is important.

The manufacturers of explosives and the railroads have strict rules regarding the condition of equipment used for the transportation of dynamite. It is only logical that the customer should transport dynamite between his magazine and the shot in trucks which are in good repair. The steering gear and the brakes should be in good working order, and they should not have leaky gas lines or loose or exposed live wires. We do not recommend that caps be carried on the same load with dynamite.

Smoking or carrying matches within a distance of 150 feet from a magazine or a shot should be prohibited, and this rule should be rigidly enforced. An occasional recess may be granted during the loading of a shot so that the men may withdraw from the shot area and enjoy a smoke.

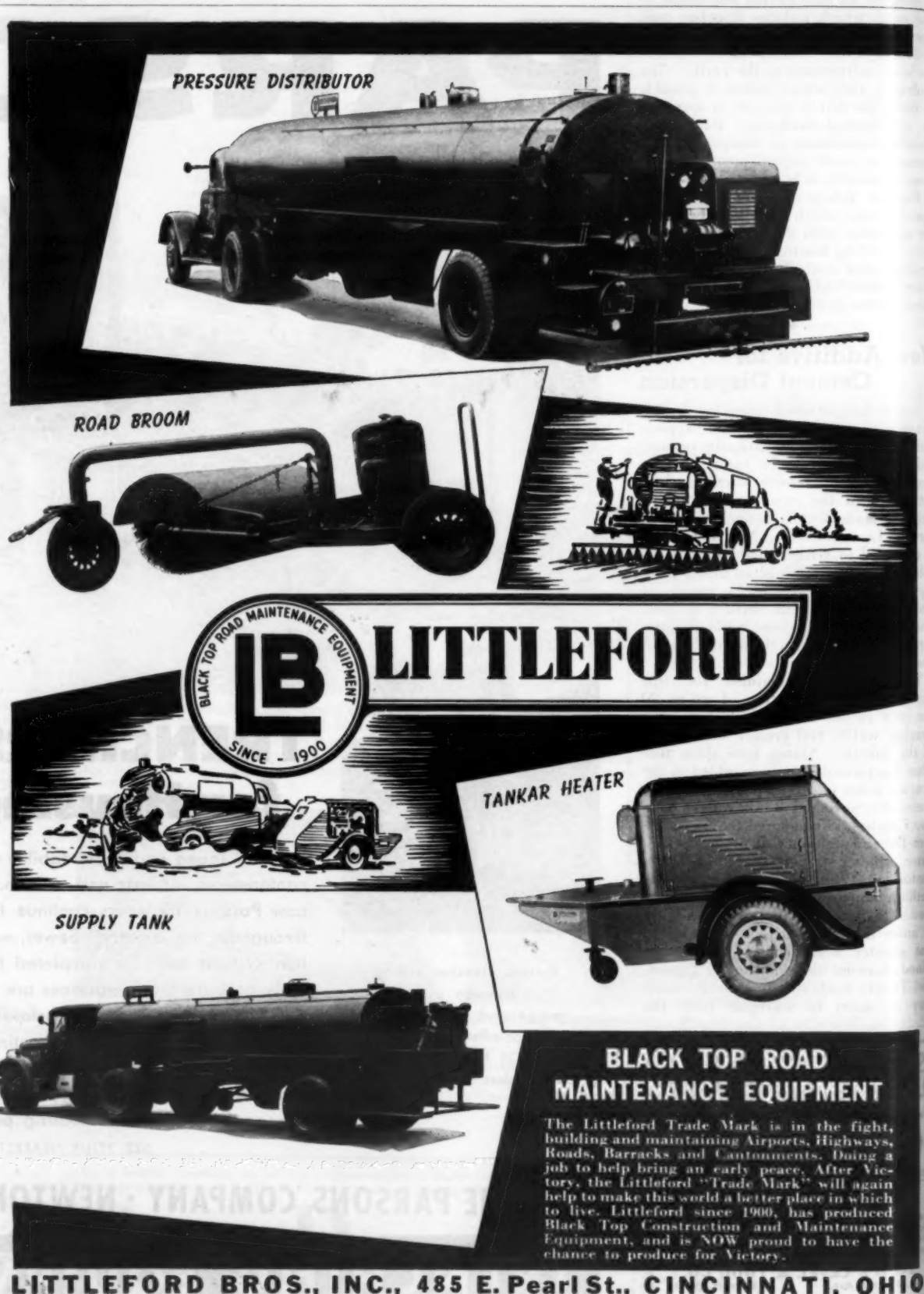
Persons Handling Explosives

The men who handle explosives should be picked for their intelligence and good sense. They should be fully conversant with the safety rules and the characteristics of explosives, what is safe to do with them, and what is dangerous. New men should be continually trained by the older experienced workmen and no one should be allowed to handle explosives until he has been thoroughly instructed. Anyone who displays a tendency toward carelessness or recklessness should be removed from the crew immediately.

The number of men engaged in any blasting operation should be held to a minimum consistent with efficiency. This requires systematizing the work so that each man has definite duties. All persons not necessary for the successful

(Continued on page 42)

THE OWEN BUCKET CO., 6030 Breakwater Avenue, Cleveland, O.
Branches: NEW YORK • PHILADELPHIA • CHICAGO • BERKELEY, CAL.
A MOUTHFUL AT EVERY BITE



BLACK TOP ROAD MAINTENANCE EQUIPMENT

The Littleford Trade Mark is in the fight, building and maintaining Airports, Highways, Roads, Barracks and Cantonments. Doing a job to help bring an early peace. After Victory, the Littleford "Trade Mark" will again help to make this world a better place in which to live. Littleford since 1900, has produced Black Top Construction and Maintenance Equipment, and is NOW proud to have the chance to produce for Victory.

LITTLEFORD BROS., INC., 485 E. Pearl St., CINCINNATI, OHIO

VULCAN TOOLS
A complete line for every type of Rock Drill, Pavement Breaker and Clay Digger.
Vulcan Tool Manufacturing Co.
35-43 Liberty Street, Quincy, Mass.
Branch Offices and Warehouse Stock:
74 Murray St, New York, N. Y.
34 No. Clinton St. Chicago, Ill.

A file drawer of business-paper clippings from the Consumers Sand Co.'s Library of Ideas. The article shown, "Essential Materials Conserved by Care," clipped from C.&E.M., is filed under "Conservation of Equipment".

Clipping File Helps In Care of Equipment

(*Continued from page* 15)

not serious but it was beginning to show wear. Here one suggestion, put to a test with my machine, resulted in a repair which prevented the loss of a rope and the lay-up of a crane.

By acting upon one suggestion in one advertisement which had been clipped and placed in our file, we saved a good many dollars. But what is more, we saved vital needed material, and just as vital working time.

Apply Your Knowledge

It isn't always enough to know certain facts regarding preventive maintenance or how to correct faulty operation methods. These facts must be applied. The value of a workable reminder system is inestimable. Today every piece of machinery and every bit of material must provide a maximum of service, and replacements must be held to an absolute minimum. Any system or method which helps accomplish this is taking us a step nearer Victory.

I think most men who are in my line of business and have the opportunity read every issue of CONTRACTORS AND ENGINEERS MONTHLY from cover to cover. I don't know about others, but in my own case, a single reading or even a second going-over isn't enough, especially if an article contains much technical information which I feel I will need later in my work. It is these "special" articles and advertisements and company folders for which our Library of Ideas best serves. We can check the index and go to the file for an article needed at any time.

Emergency Repairs

In the summer and fall of 1942, my Byers 62 crane loaded over 300 cars of sand and handled an equal tonnage in truck loadings. All of this material was rushed to contractors who were putting every effort into the speedy completion of war jobs. We had but one machine at the Topeka location and we knew that any delay on our part meant an equal delay at the other end.

We resorted entirely to make-shift maintenance and repairs, and did the required work on the machine the quickest way as an emergency.

Then came cold weather and a forced lay-up. The crane was taken to our machine shop and given a thorough rebuilding job. I did the work myself. The only piece of new equipment used was a boom drum. The rest came from our parts bin and the scrap pile. And our crane, in fact all of our equipment, is ready to deliver the goods another season—yes, several seasons.

Every foot of our cable has been inspected and treated with a dressing. It is ready to remove from the storage drums and go to work at a minute's notice. And you cannot tell the spools of new rope from rope which has been cleaned and dressed. We were surprised at the results on both our crane and the cables.

In some cases, I think, a machine-shop rebuilt job is better than a repair job of all new parts. Some replacements, because of the special type of work, need to be stronger, or must be adjusted to specific problems of use. We have all learned that we can do a lot of things to our machines in our own shops—things which seemed impossible five years ago. And a great many of the jobs we have accomplished have been possible because we have been able to study how others have handled problems like our own.

The Library of Ideas has been a real help to us, thanks to the wealth of fine material which has appeared in business and trade publications in our field.

Airco Welding Aids

A practical treatise, "The Welding of Piping," has been released by the Air Reduction Co. Various types of ferrous and non-ferrous piping, their dimensions, fabrication, and estimates of welding and labor costs are included in the sixteen well-illustrated pages.

New and experienced welders alike will be interested in the Oxyacetylene Flame Adjustment Color Chart, also issued by the Air Reduction Co. Natural color photographs show the correct appearance of the various welding flames quickly and accurately and, it is stated, make the chart a valuable guide for every welder.

Copies of "The Welding of Piping" and the chart may be obtained upon request to Air Reduction Co., 60 East 42nd St., New York City, by mentioning this magazine.

PILE HAMMERS
and
EXTRACTORS
HOISTS—DERRICKS
WHIRLERS
•
Special Equipment
Movable Bridge Machinery
•
Write for descriptive catalogs
McKIERNAN-TERRY CORP.
19 Park Row, New York
Distributors in Principal Cities

Roads? THEY MAKE THEIR OWN ROADS!

WALTER TRACTOR TRUCKS

THE specially designed, rugged, powerful Walter Tractor Truck is not built for paved highway hauling. The heavier the loads—the rougher the roads—the steeper the grades, the more the great power and traction of Walter 4-Point Positive Drive are demonstrated.

Walter Tractor Trucks are used for jobs that rear wheel drives can't handle—and where conventional four-wheel drives falter. For example, bucking heavy snowdrifts; hauling heavy loads through soft dirt, mud, ruts, broken terrain and up stiff grades, as in off-the-road and construction work; pulling enormous trailer loads in coal and iron mines, logging and similar work.

To accomplish this, Walter Tractor Trucks embody such features as patented automatic lock differentials, suspended double reduction drive, tractor type transmission and many others. If you have punishing hauling jobs, write for literature explaining why Walter Tractor Trucks are best designed and constructed to handle them.

WALTER MOTOR TRUCK COMPANY
1001-19 Irving Ave., Ridgewood, Queens, L. I., N. Y.

Field Photos Tell Their Stories

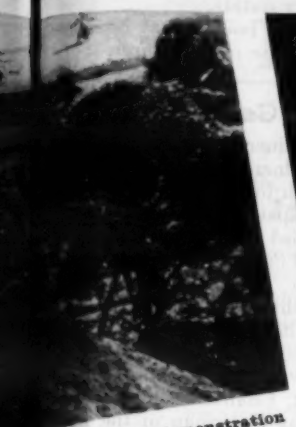
SPRING TROUBLES. One of the maintenance activities of the Franklin County, Ohio, Highway Department is the removal of logs and debris from dams each spring after high water recedes.

FREE FRENCH officials in the Cameroons of a LeTourneau bulldo... This unit was used not only for road work but als... doing the job between tropical downpours. Ameri... on the fight for freedom all over the world, prep... sary facilities for United Nations forc...

PILE DRIVER. This unusual unit was built by the Lac qui Parle County, Minn., Highway Department by converting an old four-wheel-drive truck into a pile driver for bridge work. It is operated by a winch driven from the power take-off and will handle piling up to 40 feet. Note the steps for safety in getting on and off the truck platform.

LIFE LINE. A flock of Trackson pipe layers on Caterpillar tractors laying a pipe line in Arkansas.

RAILROAD maintenance near Watkins, Colorado. LaPlante-Choate and LeTourneau scrapers with Caterpillar tractor and a bulldozer build ditches and backslopes.



...see their first demonstration ...D7 on an old road at Douala. ...ducting a local Army rifle range, ...struction equipment is carrying ...r bases and building the neces... ...nd, sea, and in the air.

ROCK. A Pioneer crushing and screening plant, powered by two Caterpillar D13000 diesels, handles 100 tons an hour, 16 hours a day, on the Barranquilla-Cartagena highway in Colombia, S. A.

AIRPORT. Bolivia in South America has leaped from the llama to the airplane for transport of its products. Because of its location and terrain, air transportation is playing a vital part in the development of this country. At right, a LeTourneau Carryall with D7 tractor is hauling material from a coral deposit for surfacing at an airport of the Pan-American-Grace Airways at Puerto Suarez.

DRUMS. Road construction is playing an important part in the economic development of the "other Americas," although in many cases the methods used still seem primitive to us. Here drums of bitumen are being emptied into a distributor for use on a road project in Colombia, S. A.
Public Roads Administration Photo

ALL AT SEA. When a Marion crane goes to sea, that's news. Although such equipment is usually land-based, this Marion, mounted on a sea-going scow, is engaged in breakwater construction in the Gulf of the St. Lawrence.

FOUNTAIN. Arc welding is spectacular as well as vital in the nation's war effort. Here a massive steel pedestal is being fabricated at a Syracuse, N. Y., welding shop.

Soil-Cement Paving For Air Field Aprons

(*Continued from page* 13)

the wheels of the power grader. This left the soil-cement mix homogeneous as to component materials and density.

Compaction and Cure

Two sets of four sheepsfoot rollers were pulled over the lane by International TD-40 tractors and a set of two rollers by a small Cletrac tractor. The sheepsfoot tamping rollers were continued over the area until they completed the compaction of the mix from the bottom up to within 2 inches of the top. Then a Buckeye spreader was used to add 2 per cent of cement by volume and this was thoroughly mixed into the top 2 inches by a Seaman Pulvi-Mixer. The lane was then in a compacted condition for the bottom 6 inches and loose for the top 2 inches. This was thoroughly compacted by repeated rolling with three Bros pneumatic rollers. When the surface had set up reasonably hard, the top was bladed off for a depth of about ¼ inch by one of the Caterpillar power graders.

During these operations water was added as required by the large semi-trailer 2,200-gallon tank trucks which delivered the water by gravity, and by a pair of 1,100-gallon trucks equipped with fine spray nozzles through which the water was "fogged" onto the surface by means of Rex centrifugal pumps mounted on the rear of the trucks. These kept the moisture content within the optimum value at all times.

Upon completion of the rolling by the Bros units and the blading off of the rigid surface, the lanes were cured for a period of 7 days with 1½ inches of wet soil sprinkled twice daily, or more if needed to keep the surface of the soil-cement mix moist. Upon completion of the cure, the soil was bladed off and loaded onto trucks.

A Day's Schedule

An operation like this cannot be handled within a set time schedule, with all work running for the same length of time. The cement spreading began at 6 a.m. on a lane prepared the previous day, the first Gardner mixer was started at 7, the second at 8 and the third a few minutes later. The mixers completed their day's work between 3:30 and 4:30 p.m. All the other equipment was off the job by 7:30 except the graders making the final surface cut which was done sometimes just at dusk. Some slight difficulty with the accuracy of the final blading resulted in the stopping of that work before dark.

About ten 7-foot strips 2,450 feet long were usually completed within the working hours listed above.

Personnel

The extensions of the parking aprons for this training field were made by contract under the direction of the U. S. Engineer Department.

In the interest of national security, reference to the location and personnel connected with U. S. Army construction is omitted.

HEET-MASTER—SAVES 50% ON FUEL

HEATS TAR & ASPHALT TWICE AS FAST

Send for Bulletin No. 196 HEET-MASTER Kettles for FREE on Contractors

AEROIL BURNER CO., INC.
5775 Park Avenue, West New York, N. J.
Chicago San Francisco Dallas

C. & E. M. Photo
Fogging the surface of the processed soil-cement mix during compaction and initial curing at a Southwest Air Field.

How Diesel Engines Are Serving and Saving

The transformation of the diesel engine from a ponderous stationary power unit to adapt it to heavy-duty cross-country work is described in a booklet recently issued by the Caterpillar Tractor Co., Peoria, Ill. The illustrations show Caterpillar equipment at work demolishing bomb-shattered walls, doing emergency work with the combat forces, building vital supply roads and other important activities in the war effort. Tribute is also paid to Caterpillar dealers for their part in working for victory by reconditioning worn parts and serving as repair bases for various mechanized military outfits.

Copies of this booklet may be secured by writing to the manufacturer.

J. W. Gardner Dies

J. W. Gardner, who was associated with the Gardner-Denver Co. from 1881 until ill health forced him to retire from active participation in business several years ago, died recently after a long illness. Son of the founder of the Gardner Governor Co., one of the original companies forming the present Gardner-Denver Co., he entered his father's company after college and eventually took over its active management. He served as President, Chairman of the Board, and finally as Chairman of the Executive Committee of the Gardner-Denver Co.

His industrial activities resulted in national recognition and he was past president of a number of national associations and societies.

"Buddy, meet an old friend"

You who use this friendly, long-life wire rope here at home can imagine what it would mean to you. Old side kicks who used to work with you are now in distant parts. If ever dependability counted in wire rope, it's doubly vital there. So when a Wickwire-rigged Liberty Ship gets through to them, and from its cargo unloads this reel with the friendly, trusted name, you can be sure it brings cheers.

The boys out there came from every American industry. They know that *you* need Wickwire Rope, too. So they're mighty thankful when you make what you have last longer, so that more can be spared for new shipping and for *their* heavy work along the fronts.

But when you do need more wire rope, please order it without reels, if lengths will permit, so our boys can have this greater convenience. Will you? Wickwire Spencer Steel Company, 500 Fifth Ave., New York, N.Y.

First Maritime M and Victory Fleet Flag in all New England was awarded to Wickwire for outstanding production achievements.

DO YOUR MEN UNDERSTAND STRETCH?

The free book, "Know Your Ropes," tells them just what to expect, and what to look out for. In addition it pictures splicing methods, life-extension rules, etc. This book can save you money—and save wire rope for the war fronts. Send for your free copy.

SEND YOUR WIRE ROPE QUESTIONS TO WICKWIRE SPENCER

WICKWIRE ROPE

Sales Offices and Warehouses: Worcester, New York, Chicago, Buffalo, San Francisco, Los Angeles, Tulsa, Chattanooga, Houston, Abilene, Texas, Seattle. Export Sales Department: New York City

WISSCO PRODUCT

Watch Your Buckets And Make Them Last

Lubrication Needs Most Care, Followed by Frequent Checking of Wear and the Tightness of Bolts

AMONG the hardest-worked and frequently maltreated equipment in the construction field are shovel dippers and clamshell, orangepeel and dragline buckets. As one engineer aptly puts it, "Buckets are subject to so many abuses because they are not only where the hard work is done, but they get thrown around frequently in a rather unorthodox way." Thus, in addition to careful lubrication, and inspection for wear and breaks, we must consider the human factor in bucket operation. Reasonable care on the part of the operator will add greatly to the life of any bucket.

It is true that at the present time there are many green operators, lacking in experience, whose handling of buckets has not prolonged their lives. This article is prepared to aid users of all kinds of excavating buckets to lengthen bucket life by careful maintenance.

To the harassed contractor having trouble with green operators, we would call attention to the fact that there are still hundreds of old shovel and crane operators who take pride in their machines, who have not listened too long to the lure of war-plant jobs, and who can still make the dirt fly. Shovel and crane manufacturers are trying to maintain their list of these men who are looking ahead to the next job.

Maintenance of Shovel Dippers

Power-shovel dippers are built up from castings and plates to form a single unit. In some cases rivets are used in assembling these parts, while others are welded. In the case of riveted buckets, or small-capacity buckets in one piece, welding offers the speediest method of repair.

The dipper bail and door need regular inspection and lubrication and the latch bar must be maintained so as to operate properly or much delay will be experienced in loading materials.

Replaceable teeth and lips are features of modern buckets which maintain the efficiency of dirt moving. Reclamation welding is one of the big things that is coming out of this war and many heavy-equipment users are being convinced that a worn part is not ready to discard if it can be restored by welding.

Here is an interesting example of a salvage job on a power-shovel dipper tooth, typical of this type of work. A large manganese-steel cast dipper tooth had worn down and required rebuilding. After localized heating with a torch, never over 300 degrees on manganese steel, a repointer bar was torch-cut to the correct width and then welded ⅛ to ¼ inch off the center line of the tooth. A space equal to the diameter of the welding rod was left between the repointer and tooth to provide penetration of the first beads. The bead was carried across the full width of the tooth, held to 1 inch wide, and peened vigorously. Then the tooth was turned and the other started in the same way. Several beads were applied and peened on each side alternately until the tooth and repointer were flush. Worn dipper teeth are reclaimed in this manner at about one-quarter the cost of new teeth and even greater service results because of the work-hardening peening that is done during the welding operation. An ideal way to maintain latch bars and keepers in an efficient state of operation is to hard-surface that portion of the bar and keeper where the greatest amount of wear occurs.

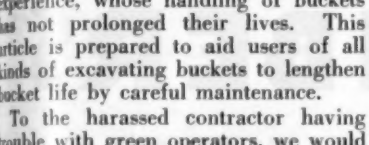
Where a dipper front is actually worn through at one spot, it can be reclaimed by welding. In one case the original weight of the manganese-steel front of a bucket was approximately 5,500 pounds and about 550 pounds of welding material was applied, thus saving approximately 4,950 pounds of casting metal for other war production.

Next to the teeth, the lips of a dipper get the most wear in digging and loading material. In loading rock that has been shot, the lip receives impact shocks and abrasive wear. In pit work, it must combat the extreme abrasion from the scouring of sand and gravel as it passes over the lip. Renewable-lip dippers have been developed by one manufacturer, making it unnecessary to scrap an entire dipper front when a lip has become worn. Early renewable lips were of the riveted type but now may be purchased, fastened to the dipper back by internal U-bolts and to the lower or renewable front by interlocking joints and pins. It is necessary merely to remove and replace the lip when worn. A longer time is required to replace a riveted lip.

Putting old buckets back in service depends upon the ingenuity of the welder. A case in point involved the repair of a large manganese-steel dipper that was pretty well worn out and had been held for a spare by a quarry company. They figured that if they could build it up so that it could be serviceable it would be another contribution to national conservation. Short pieces of nickel manganese steel filler bars, both round and square, were tacked on along the edge of the worn-down lip and nickel man-

(*Continued on page 46*)

COMMERCIAL HEAT TREATING
SEASONING OF STEEL
CADMIUM, ZINC, TIN and HARD CHROME PLATING
ALL KINDS OF GRINDING OPERATIONS
A COMPLETE MANUFACTURING PLANT
ENGINEERING DIVISION
AGERSTRAND CORPORATION
Muskegon, Michigan
Sales Office: 1900 E. Jefferson Ave. Detroit, Mich.


Complete Line of DERRICKS *and* WINCHES
SASGEN DERRICK CO.
1101 W. Grand Ave. Chicago, Ill.

415,000 TONS of ROCK for VICTORY
LESS THAN SEVEN MONTHS OUTPUT for the KASER CONSTRUCTION CO.
ADEL • IOWA
Output like this means something to you for the future! 415,000 tons of stabilized base, concrete aggregate and sub-base materials (all for vital defense projects) is a real indication of what Cedarapids plants are doing under pressure.
This is the output of *one* Cedarapids plant owned by the Kaser Construction Company of Adel, Iowa, on their Lecompton, Kan., Eudora, Kan., and Pawnee, Okla., jobs which cover a period of less than seven months time.
Output like this can only be accomplished with trouble-free service day after day—the kind of service that you are going to require after the "Duration".
It doesn't matter what your aggregate reduction and producing problem is—whether it is small or large—Cedarapids plants can be engineered for any combination of final size or production. *Iowa can meet your future plans* whether it is for crushers, screens, bins, asphalt plants, driers, or portable or stationary plant equipment. Now is the time to familiarize yourself with Cedarapids equipment. Come to headquarters for aggregate producing equipment.
IOWA MANUFACTURING CO.
Cedar Rapids • Iowa
Cedarapids
BUILT by IOWA
FOR VICTORY BUY UNITED STATES SAVINGS BONDS AND STAMPS
Production for Victory

The Role of Industry In Post-War Planning

(*Continued from page* 19)

tion projects, power projects, and others both new or held in abeyance by WPB wartime restrictions will all take their rightful places in this post-war construction period if financing is assured by the action of a Congress which has the interest of the entire country at heart. There must be no "pork-barrel" legislation, no endeavor to favor one section of the country over another by political trading, but the construction of the major projects that will provide the greatest overall employment and public benefit for the most reasonable expenditure of money.

Actual employment at the site of the project is not the full measure of its value. The additional contribution to employment in the shops and factories of the country and the extent of its potential value in supplying food stuffs or transportation for food and manufactured articles must be the factors given the most consideration in the choice of each project.

The planning of public works and the contribution to be made by such projects in serving as a stop-gap against unemployment and inflation in the immediate period after the cessation of hostilities will be discussed in more detail in the series of articles to follow this introduction to post-war planning problems.

What Is Industry Doing?

"American business management, with the single current responsibility of building the machines necessary to win the war, must assume additional responsibilities after the war if the system of free enterprise is to survive," Eric A. Johnston, President of the U. S. Chamber of Commerce, told those attending the New York Herald Tribune Forum on Current Problems.

"During the 1920's and '30's," Mr. Johnston said, "American business, through sticking to the single function of management, was threatened with destruction by the industrial civilization it had created." Asserting that American management's record in arming wartime America is irreproachable, Mr. Johnston continued, "But, with the acid animosities of the depression still etched on our minds, will we be wise and tolerant and efficient enough to cope with the complexities of our civilization when victory is won? Will management be ready to meet its community as well as its business responsibilities? . . . If private enterprise can't provide employment for most of our people after the war, we might as well understand now that the American enterprise system and many of our freedoms will be extinguished. The state will be the employer and the people will be under state domination and direction."

We believe that, in general, American industry does sense its responsibilities for the post-war period, for it is upon industry's ability to reconvert from wartime production to the manufacture and distribution of peacetime consumer goods that the future prosperity—in fact, the very life—of industry depends. Forward-looking manufacturers already have post-war planning committees within their organizations preparing for the problems ahead.

It is reported that private industry is ready to spend $23,000,000,000 a year for the conversion to peacetime production. If this is correct, the public-works program for the slack period, while private industry is getting into gear, will not be as extended as some have thought necessary. The Committee for Economic Development, organized among a group of business men under the able leadership of Paul G. Hoffman, President of the Studebaker Corp., is going forward actively with a program that will put private industry in the forefront in economic preparedness for the post-war period. To find work for the approximately 55,000,000 employables as soon as possible after the war, as compared to an employment of 46,000,000 in 1940, Mr. Hoffman points out that the nation must sell an annual output of between $135,000,000,000 and $150,000,000,000, or 35 to 50 per cent more than the 1940 output of $100,000,000,000 for goods and services. The desired objectives can be reached, according to Mr. Hoffman, and new jobs created in sufficient numbers only if a requisite number of Amer-

(*Continued on next page*)

2" High-Pressure Pump

Light weight, high-capacity, self-priming

Delivers 65 gallons per minute against 50 lbs. pressure, or 50 gallons per minute against 65 lbs. pressure. Suitable for jetting piles, supplying water to concrete mixers through long pipe lines against high pressure.

Ask for bulletin describing high-pressure pump.

Made by

MARLOW PUMPS

Ridgewood New Jersey

Bases for BOMBERS

★ *Made by* **HERCULES.**

★ *Delivered by* **HERCULES**

Besides HERCULES Speedraulic Hoists and Dump Bodies for civilian use and the huge Cargo Bodies produced for the U. S. Army, thousands of Airplane Landing Mats for emergency "Bomber Bases" have been turned out by the big Hercules plant the past year. HERCULES Dump Cargo Bodies, like the one shown above, mounted on a Chevrolet chassis, are used for transporting such materials on many fronts.

REMEMBER THESE "HERCULES" FEATURES!

- Exclusive Center-Lift Hoist Action
- Double Bridge-type Lift Arms
- Balanced Piston Valve, with finger-tip control
- 6", 7", 8" and 10" Hoists

Heavy production for war will continue in all lines until victory is won, but if your need is essential, your Hercules distributor can take care of you.

HERCULES STEEL PRODUCTS COMPANY

GALION, OHIO

CMC

MIXERS
BATCHERS
PUMPS
SAW RIGS
HOISTS
CARTS
BARROWS

CHECK WITH YOUR CMC DISTRIBUTOR ON

—rebuilding . . . repairing . . . reselling your equipment.
—new CMC equipment that may be available.
—repair parts and service.
—rentals.

GET FREE CATALOG

HE'LL HELP YOU!

CONSTRUCTION MACHINERY CO.

WATERLOO, IOWA

Post-War Plans Must Be Based on Ethics

(Continued from preceding page)

ican business men begin to make their post-war plans now, and provided an environment favorable to business enterprise is furnished by the Federal government.

Henry A. Wallace, Vice President of the United States, recently pointed out in *Foreign Commerce Weekly* that successful foreign trade and stable world economy, after hostilities cease, will depend on soundness, vigor and breadth in our measures of reconstruction. He stated, "Maintenance of full employment and the highest possible level of national income should be the joint responsibility of private business and of Government. It is reassuring to know that business groups in contact with government agencies already are assembling facts, ideas, and plans that will speed up the shift from a Government-financed war program to a privately-financed program of peacetime activity."

Will Religion Back Us?

All plans for the post-war world—international, political, economic and social—will depend on the spiritual and moral attitude of those who make them. In the Christmas issue of *The New Yorker*, there appeared a significant full-page advertisement. On a background of deep night-sky blue was reproduced the star of Bethlehem, and below appeared these words: "A Plan for the Post-War World—Peace on Earth, Good Will toward Men." Yes, the post-war plan would be as simple as that.

The main argument of the skeptics against the possibility of a world based on Christian principles is that you can't change human nature. This is probably true, but the fallacy in such argument lies in the assumption that human nature is necessarily all bad. It is obvious that much of it is. Greed, selfishness, narrow nationalism and bigotry—the same evils which crucified Jesus 2,000 years ago—are responsible for the holocaust in the world today. But the same fearless vision, faith in mankind, and moral courage which characterized the life and death of Jesus are exemplified in true stories from every fighting front and each of the United Nations today—stories of unselfish heroism, human kindness, faith in one's fellow men, loyalty to one's principles, and magnificent courage. All that is in human nature too. It is the question resolves itself into which shall we choose—leaders who by their faith, decency and courage will take us along the path toward the heights of human behavior, or those who, unable to learn by the experience of 2,000 years, will follow the policy of personal gain, political advantage, and selfish nationalism—the "me first" principle—which will do nothing more for the world than lead it toward another war for the next generation to fight.

What are the youth of our armed forces thinking about the future? A young man whom we have known for nearly two decades was among that gallant band of Marines who took over Guadalcanal. During the days spent there he had time to think of the future, which frequently looked rather insecure. The following extract from a letter dated August 5, 1942, to his father, a teacher in an eastern preparatory school for boys, is significant.

"The Japs and the Marines should be mingling soon and I trust that we shall have the situation well in hand. Because it may be some time before I can get another letter off to you, I wish to ask you a few favors. Teach the boys at the school to 'live for democracy', and not be like the Germans or Japs who die for the Fuehrer or the Emperor. I fear that I, like many of the young people during the '30's, took American democracy too much for granted. We must teach the future generations to *live* for democracy, to preserve and to plan for it, if we are ever to hope to combat the Axis forces and ideas. Somehow it would make me feel better that future generations of Americans should learn more than just the lesson of war from this Second World War, so that, whatever may befall me and my buddies, we haven't suffered or died in vain. You have been my father and hoped that I would grow up to be a useful man; it is now my turn to hope that the generations who come after me may be useful men and women, even though I may never be a father. Please forgive me if this letter isn't cheerful; it is not meant to be sad, but merely to let you know how I feel about the war and the peace which must some day come again."

A letter from an Infantry Division Chaplain in the south, a veteran of World War I and recipient of the Dis-

(Concluded on page 56)

The better the efficiency of your materials handling methods and machinery, the quicker and better you can finish a job. Investigate the possibility of improving your present materials handling methods. Consider the advisability of entrusting your problems to ROBINS. Send for bulletins in which you are interested.

FOR MATERIAL AID in MATERIALS HANDLING

It's ROBINS

110CM • **CONTRACTOR'S SCREEN.** Small, semi-portable, general-purpose.
111CM • **ELIPTEX SCREEN.** For coarse sizing.
115CM • **GYREX SCREEN.** For heavy-duty sizing and scalping.
122CM • **VIBREX SCREEN.** For fine sizing.
113CM • **SCREEN CLOTH.** Improved Super-Gyralay is longest wearing.
120CM • **IDLERS.** Troughing, Training, Rubberdisc, Return.

ENGINEERS • FABRICATORS • ERECTORS

ROBINS

CONVEYING BELT COMPANY

PASSAIC • N. J.

MATERIALS HANDLING MACHINERY

The greatest enemy our Air Force has to meet!

• It's ice . . . ice that can coat a plane at the rate of 3½ inches a minute!

Fortunately, most of our planes are equipped with automatic de-icers . . . rubber edges on wing and tail that are automatically inflated with compressed air when ice reaches a certain thickness. This breaks the ice covering . . . then the rushing air catches it . . . whips it away!

The instrument that measures the ice thickness is an electrical indicating instrument . . . one of more than 200 that guard the lives and increase the efficiency of our flying men.

Because these instruments must be made with all the precision of a fine watch . . . we at Gruen have been asked to turn our 69 years' experience in this field to making instruments of this type for all services.

That is why you may be unable to obtain the particular Gruen watch you want. But we know when you think of the reason . . . you'll understand.
The Gruen Watch Company, Time Hill, Cincinnati, Ohio. In Canada: Toronto, Ontario.

GRUEN
THE PRECISION* WATCH
*REGISTERED TRADE MARK

BUY A GRUEN WATCH . . . BUT BUY A WAR BOND FIRST

AMERICA'S CHOICE SINCE 1874

COPYRIGHT 1943, THE GRUEN WATCH COMPANY

GRUEN . . . MAKERS OF THE PRECISION* WATCH . . . AND PRECISION INSTRUMENTS FOR WAR

W. D. Mendenhall and his son Bob.

Novel Device Speeds Topsoiling Operation

(*Continued from page* 17)

denhall, sons of this pioneer contractor, are the present members of the firm, each with a background of road-building experience. W. D. Mendenhall was Superintendent on the job described above and developed the device which contributed so much to the satisfactory results.

The Contractor's Contribution

In nominating the G. W. Mendenhall & Sons Construction Co. for one of our Roadside Development Awards, W. H. Earnshaw, Landscape Engineer, and W. L. Anderson, Design Engineer, State Road Commission of Utah, pointed out that the development of this device for topsoiling roadside slopes was a contribution not only to roadside development but also to the highway department as a whole, because of the economy in construction and the reduction of maintenance to a minimum as a result of such excellent work.

Most of the winners of our Roadside Development Awards have been contractors whose jobs included some roadside-development items, but this contract held by Mendenhall did not. Their contribution to roadside development is just as great, however, and particularly commendable since their concern in leaving such excellently dressed slopes was definitely beyond the requirements of the specifications.

This work was done under the direction of the State Road Commission of Utah, for which R. Simpson was Resident Engineer.

New Mack Production Chief

The appointment of A. N. Morton as Production Manager of Mack's three huge motor-truck plants has been announced by Charles T. Ruhf, President of the Mack Mfg. Co., and Executive Vice President of the parent company, Mack Trucks, Inc. Mr. Morton, formerly Factory Manager of the Plainfield, N. J., plant, will extend his duties to the New Brunswick, N. J., and Allentown, Penna., plants as well. In taking over this new position, Mr. Morton succeeds Mr. Ruhf who had been Operating Vice President in charge of factories before assuming the presidency.

The three plants which Mr. Morton will manage have all received the Army-Navy "E" for excellence in war production.

Kipp New Chief Engineer For Minnesota Highways

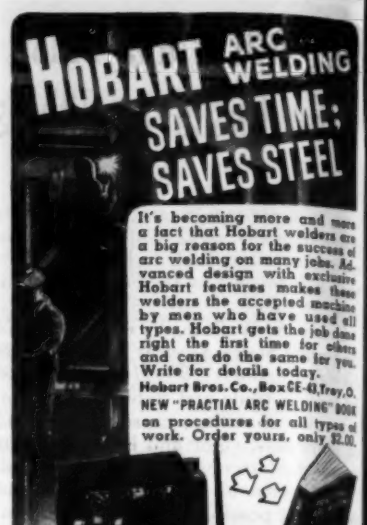
Announcement has been made by M. J. Hoffmann, Minnesota Commissioner of Highways, of the appointment of Orin L. Kipp as Assistant Commissioner of Highways and Chief Engineer of the Minnesota State Highway Department, to succeed the late J. T. Ellison, and of Gordon G. Gladman as Engineer of Plans and Surveys.

Mr. Kipp has been associated with the Department since 1914 and has served in various capacities. In 1921 he was appointed Construction Engineer in charge of surveys, plans and construction, and early in 1939 he was appointed Acting Chief Engineer of the Department for five months while Mr. Ellison was on leave of absence. On July 1, 1939, he became Assistant Chief Engineer and Planning Engineer. He has served since 1928 as Chairman of the Committee on Road Design of the American Association of State Highway Officials and was selected as a member of the Special Committee on Administrative Design Policies of the Association. He has also been active in the work of the Highway Research Board.

Mr. Gladman entered the employ of the Highway Department in 1921 as Engineer of Surveys, after serving two years on the Itasca County, Minn., engineer staff. He was appointed Division Engineer in 1925, and in 1929 became Engineer of Surveys and Design, which position he has held until his present promotion.

Asphalt Use Near Record

Asphalt tonnage, despite curtailment of shipping facilities to the Atlantic Seaboard, continued through 1942 at practically the record-high level of 1941, according to U. S. Bureau of Mines' figures. The reduction was but 2 per cent between the two years. Shortages were not permitted to cut Army and Navy use, and the delivery of asphalt for airport development was maintained as far as practicable.


HOBART ARC WELDING
SAVES TIME; SAVES STEEL
It's becoming more and more a fact that Hobart welders are a big reason for the success of arc welding on many jobs. Advanced design with exclusive Hobart features makes these welders the accepted machine by men who have used all types. Hobart gets the job done right the first time for others and can do the same for you. Write for details today.
Hobart Bros. Co., Box CE-43, Troy, O.
NEW "PRACTIAL ARC WELDING" BOOK on procedures for all types of work. Order yours, only $2.00.
One of the World's Largest Builders of Arc Welders

SOIL STABILIZATION is speeding military operations wherever our armed forces are or go. Using local materials or any others available, highways, landing strips and airfields can be built or repaired faster, better, more economically.

ROTOTILLER Roadmaker is the pioneer "3-in-1 Rotary Action Machine" especially designed and built for soil-cement and soil stabilization work. The "3-in-1 Rotary Action" assures more accurate control in both wet and dry mixing operations as well as more thorough pulverization of materials. The fast-revolving, self-sharpening tines thoroughly mill the earth from top to bottom to a depth of 12 to 18 inches *in one operation.*

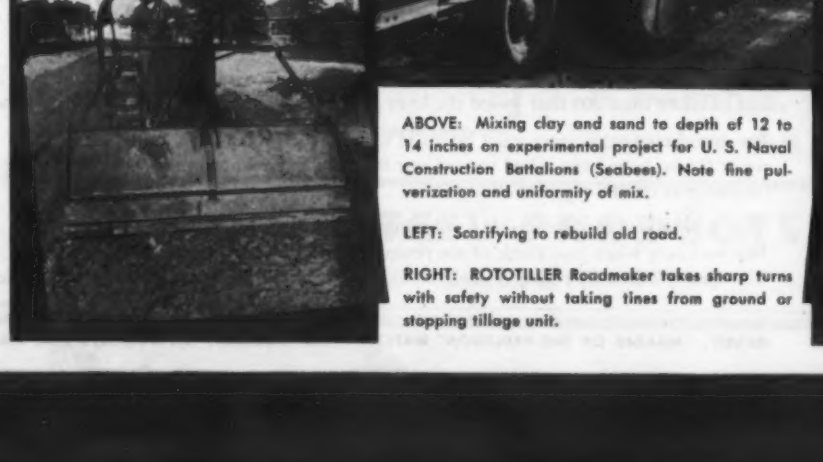
GET THE FACTS on this 1943 job-tested ROTOTILLER Roadmaker. Write for descriptive literature.

ROTOTILLER, Inc.
Dept. N TROY, N. Y.

7 STAR FEATURES

1. Improved, self-sharpening, single unit spring-tines.
2. 4-speed transmission permits use for scarifying as well as mixing.
3. Flexible tilling unit gives fast, easy operation; sharp turns with safety.
4. Weight of tilling unit variable to suit conditions; lessens wear.
5. Depth of operation regulated to within one-half inch.
6. Powerful 6-cylinder Chrysler motor operates economically on 1 to 2½ gallons of gasoline per hour, depending on conditions.
7. Strong, dependable ROTOTILLER Roadmaker cuts 6 ft. wide, 12 to 18 inches deep, with complete ROTOTILLAGE across entire width of cut — no untilled areas.

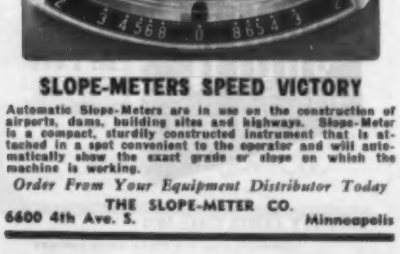
Post war plans undoubtedly will call for thousands of miles of soil-cement and oil stabilized secondary roads. Returning soldiers will find economic security in this work. Then, as now, ROTOTILLER Roadmaker will serve faithfully and well.



ABOVE: Mixing clay and sand to depth of 12 to 14 inches on experimental project for U. S. Naval Construction Battalions (Seabees). Note fine pulverization and uniformity of mix.

LEFT: Scarifying to rebuild old road.

RIGHT: ROTOTILLER Roadmaker takes sharp turns with safety without taking tines from ground or stopping tillage unit.



SLOPE-METERS SPEED VICTORY

Automatic Slope-Meters are in use on the construction of airports, dams, building sites and highways. Slope-Meter is a compact, sturdily constructed instrument that is attached in a spot convenient to the operator and will automatically show the exact grade or slope on which the machine is working.

Order From Your Equipment Distributor Today

THE SLOPE-METER CO.
6600 4th Ave. S. Minneapolis

Controlling Debris In Culvert Openings

Various Methods Used by California Division of Highways Offer Solution For Practically All Debris Problems

♦ ALL highway departments, state, county, town and city, have experienced the clogging of the entrances to otherwise adequate culverts, thereby causing serious damage through washouts around the culverts, or flooding of upstream areas. The hydrology of California with its flash flows in many streams has accentuated this problem and has led to a very complete study by a committee of the California Division of Highways. A section of the report released in October, 1942, by *California Highways and Public Works,* deals with the methods of deflecting or retarding the movement of water-borne debris of various types.

The burdens carried by streams are divided into: 1. Very light floating debris; 2. Light floating debris such as small limbs or sticks and other refuse; 3. Medium floating debris such as large limbs and large sticks; 4. Heavy floating debris such as logs and trees; 5. Flowing debris including heterogeneous fluid masses of clay, silt, sand, gravel, rock, refuse, or sticks; 6. Fine detritus which includes a fairly uniform bed-load of silt, sand, gravel, or other materials more or less devoid of debris but tending to deposit upon diminution of velocity; 7. Coarse detritus such as coarse gravel or rock fragments; 8. Boulders which are carried as a bed-load at flood stage.

The types of debris control devices recommended by the committee include deflectors, racks, cribs, risers, basins and spillways.

V-Type Deflectors

A debris deflector is adapted to the diversion or deflection of heavy floating debris and large boulders or rocks carried as a bed-load in moderate to high-velocity flows often encountered in mountainous terrain. This type is particularly useful at the entrance to large culverts and should be of heavy construction with the point of the "V" placed upstream. The point, or vertex, may be vertical or inclined. The horizontal spacing of the vertical members of the deflector should not exceed the horizontal diameter of the culvert. The length of the "V" generally should be not less than three to four times the horizontal diameter of the culvert. Like all other types of debris separating devices, the debris deflector requires periodic or seasonal removal of accumulated material.

Straight Barrier Racks

The debris rack in its various forms is essentially a straight rack placed across the path of a defined channel for the purpose of sieving floating debris from the stream flow and preventing it from reaching the culvert entrance at times of momentary flood peaks. The rack may be vertical or inclined. If inclined, it may serve some of the purposes of a deflector. California's experience with the debris rack indicates that a spacing of vertical bars equal to one-half

California Division of Highways Photo

A wooden-pile debris deflector installed at the entrance to a large culvert in California.

the horizontal diameter of the culvert is satisfactory. This spacing of vertical bars permits light debris to pass the rack endwise, and it will also pass the culvert.

If the channel is well-defined, the debris rack should be placed well upstream from the culvert entrance. If limited by right-of-way or channel shape, it may be installed at the head of the wings, in which case the rack should be as high as the culvert parapet.

Open Crib Barriers

The debris crib, referred to in California as a "bear trap", has been successfully developed for locations where abrupt grade breaks cause deposition of detritus and clogging of the culvert entrance. For many small culverts at or near the roadbed level, the abrupt break in grade cannot be avoided. The open type of debris crib is built of either timber, metal or concrete with or without a cover and is placed directly over the culvert entrance. When a crib, with a cover, is so placed, detritus or debris can practically envelop it without completely shutting off the entry of water into the culvert.

Where the open-crib type is used as a riser in anticipation of a considerable depth of detritus, as in a debris basin, it should be built well above the estimated height of deposit on the culvert entrance, with provision for further increase in

California Division of Highways Photo

A timber debris crib installed over a culvert entrance in a roadway gutter on a California highway.

height as deposits of detritus pile up.

Debris Risers

In mountainous terrain involving high

(*Concluded on page* 51)

RITECURE-G

(Original Concrete Cure with color indicator)

POWER SPRAY MACHINES

EXPANSION JOINT

Any type—Any size—Any quantity

THOMPSON MATERIALS CORPORATION

304 West St. NEW YORK CITY

303 Cortlandt St. BELLEVILLE, N. J.

WHAT YOU CAN DO TO HELP THE WAR EFFORT!

Take good care of everything you own. This means literally everything . . . your business equipment, home appliances, automobile, clothing, furniture, kitchen utensils and other items too numerous to mention. The less replacement of civilian necessities of life is required, the more of the national effort can be devoted to war.

Make every effort to keep in good health. Illness not only keeps you away from the job but may add to the already heavy burden of the doctors still in civilian practice and the hospitals that are operating under difficulties.

Be as economical as possible in the use of food, fuel and all kinds of household supplies. Even those products of which there are ample supplies in this country must be transported and all transport facilities are heavily burdened.

Before making a telephone call, ask yourself if it is really necessary. The telephone lines are congested with war business and material is not available to permit expansion of communication systems.

Reduce traveling as much as possible. It is hardly necessary to stress the importance of curtailed automobile travel. As for rail travel, the railroads are handling a tremendous and mounting load. No new passenger equipment is being built. Existing cars and locomotives must handle the traffic.

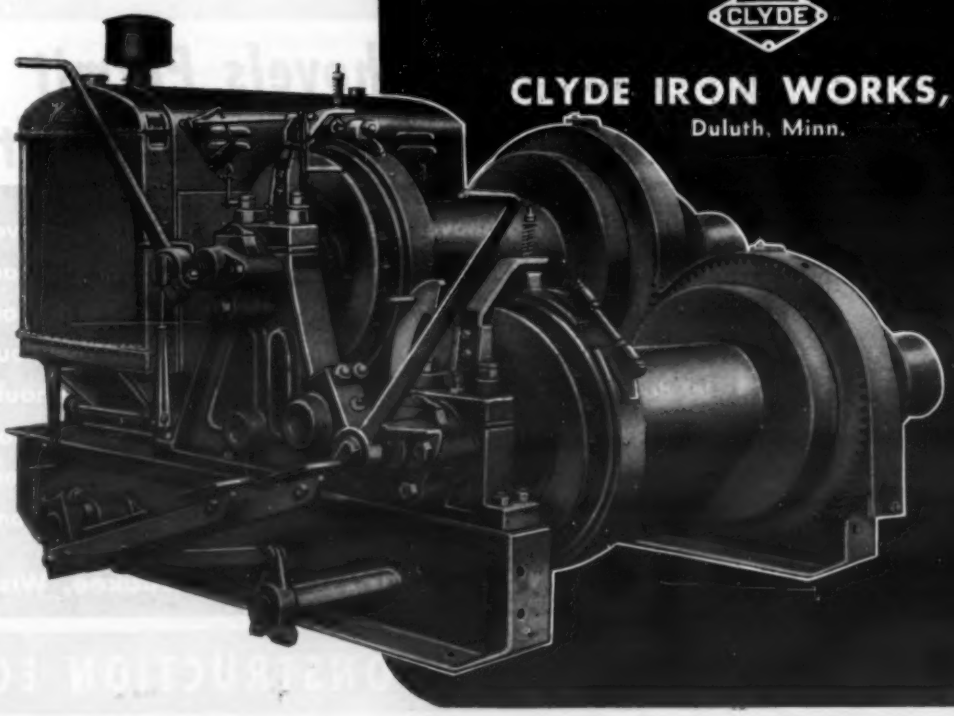
Comb your property for scrap iron and steel, rubber, copper and rags; turn these things in through local salvage channels.

Take extra good care of your construction equipment. Instruct your operator or maintenance man to give periodic check-ups to replace dangerously worn parts; lubricate thoroughly at the required intervals; keep all wearing parts adjusted for efficient performance; paint when necessary to prevent rust and take precautions to protect radiators and pipes from freezing.

Buy War Bonds every pay day.

ARMY E NAVY

For Outstanding Achievement



CLYDE

CLYDE IRON WORKS, Inc.

Duluth, Minn.

Bridge Construction Along Alcan Highway

(*Continued from page 25*)

five weeks, over 600 carloads of equipment and supplies arrived at the railhead at Dawson Creek.

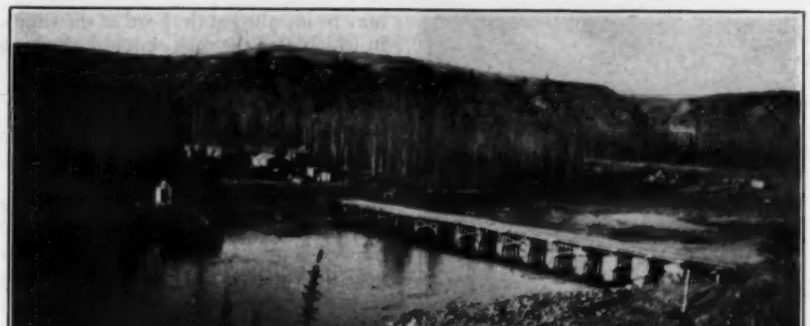
As reconnaissance proceeded, two major problems arose about the routes between the airport controls in the sections between Fort Nelson and Watson Lake and between Watson Lake and Whitehorse, respectively. Although the two possible routes were not much different in length, the chosen route afforded better soil and ground conditions for road construction.

As the various reconnoitered sections of the highway were mutually agreed upon by the Army and PRA engineers, survey crews were sent in to locate the line. As fast as survey notes developed, they were returned to headquarters for design. The first sections designed were naturally those which could be started near headquarters. As the contracts did not involve unit prices, it was not necessary to work up quantities, but the spotting of culverts and the adjustment of profiles went on relentlessly.

Standard through-truss and deck-truss timber bridge designs were made in the PRA, San Francisco. Just as designs of 1,600-pound structural-grade timber were completed for various standard span lengths, complete redesign was necessary for 1,200-pound timber, owing to an unexpected shortage in the higher grade. As approximate lengths for various-sized culverts were developed by design, they were used as the basis for placing orders, and many thousands of feet of culvert, including mostly wood stave pipe, were ordered and shipped in.

Change in Work

Up until the first week in August, 1942, this initial phase of the Alaska Highway, that is the reconnaissance and survey and pioneer road construction by the Army and full standard construction of sections near the Fort St. John, Whitehorse and Gulkana headquarters by the PRA, proceeded as previously arranged. On August 8, however, there was a substantial change as the result of a joint directive to use all forces to complete a usable truck road throughout the entire length of the route before winter freezing. As a result, the construction contractors had their work completely rearranged and were thrown in behind the Army operations on the pioneer road to widen it and to place gravel surfacing on an improved roadbed.



One of the temporary native-timber bridges spanning a river in British Columbia. This bridge will be replaced by a permanent steel and concrete structure.

Except for part of the force of Canadian contractors on the section south of Fort St. John, practically all of the remaining construction contractors' forces began during August to improve and gravel the Army pioneer road, which was widened to from 20 to 24 feet to provide a two-way passing condition. A lift of gravel or other surfacing was then applied, varying in thickness from 4 to 12 inches, depending on the need and the availability of gravel or its equivalent.

Bridges

It was also necessary for the construction contractors to apply themselves to the construction of temporary bridges over the larger streams where the Army crossing had been made either by ferry, pontoon bridge or other temporary structure. Practically all of these new bridges are of the pile-trestle type and the construction contractors, with the Army's help, have finally finished them.

It is expected that many of these bridges finished last autumn and early in the winter will not stand up through the spring break-up. A number of rivers, especially on the northern section, freeze from the banks inward toward the thread of the stream and along the bottom. The channel thus choked is unable to carry the flow, which in turn spreads over the banks and tends to inundate the approaches to the bridge. Also in the spring there are always ice jams and the hazard of drifting material.

Surveys of bridge sites show that the highway eventually will require about

(*Concluded on next page*)

Increase

Concrete Strength

with

MARVEL-KOTE

Transparent Membrane

CURING COMPOUND

approved and used

on

Defense Projects

more coverage per gallon

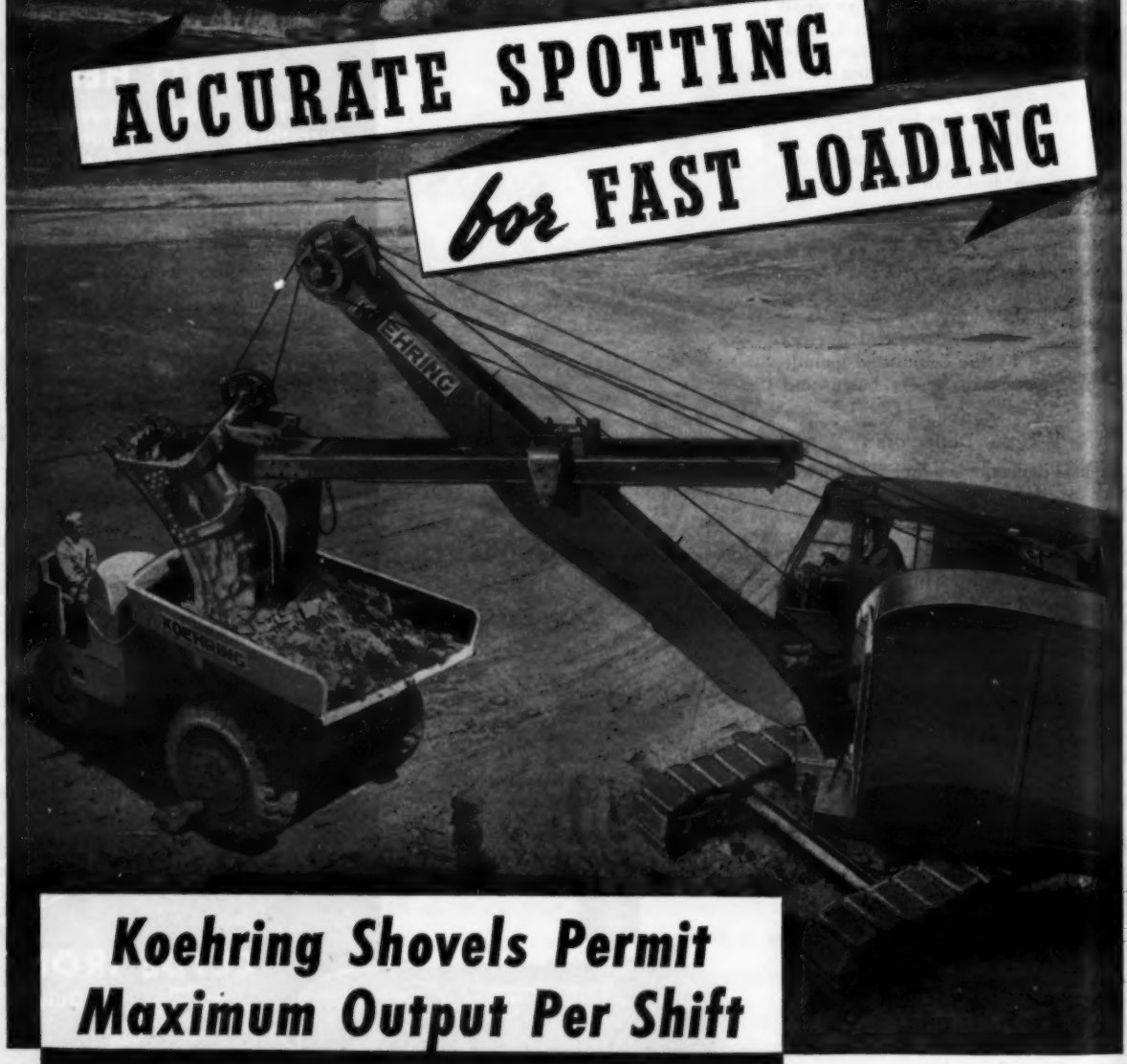
will not freeze

Write or Phone

CONCRETE CHEMICAL CO.

North Kansas City, Mo.

P. O. Box 7411



Koehring Shovels Permit Maximum Output Per Shift

With a Koehring Shovel every move is a productive move. Accurate, speedy swing provides ease in spotting for fast loading. The control is so simple and smoothly working that an operator can keep up top production for a full shift without let down. There need be no waste loading time on your hauling equipment if you are using a Koehring. Koehring features include self-cleaning crawlers—all welded construction—positive steering—fast operating speeds—quiet operation.

KOEHRING COMPANY • *Milwaukee, Wis.*

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

More Work on Alcan Highway This Season

(Continued from preceding page)

23,000 linear feet of bridging and the indicated cost runs to about $11,000,000. The PRA has been designing some of these spans and building others during the winter. The longest bridge of all will be an 1,800-foot suspension bridge across the Peace River south of Fort St. John.

Second Phase of Work

With the first phase of the Alaska Highway completed, a return to the standard design construction will be made during the coming season. Under the controlled materials priority plan to be operated in the second quarter of this year, PRA anticipates an improvement in the delivery of materials to the Highway. Also construction during 1943 will have the advantage of a going set-up of repair shops, camps, and overhauled equipment on the ground ready to go, while part of the 1942 working season was consumed in establishing the contractors' forces and facilities.

Conclusion

In closing his report, Mr. MacDonald emphasized the fine spirit of cooperation of the Army officers who commanded the engineer troops in the field, and also of the cooperative spirit of the Canadian officials during the past year. Canada's part in the undertaking included furnishing all rights-of-way, the remission of all taxes and duties, and permission to use all local road-building material.

In closing, Mr. MacDonald said, "Nowhere else on the North American continent is there an area comparable in size where a highway could be projected into such a wilderness area, or where comparable transportation difficulties would be met. Perhaps there never has been a unit of highway construction of comparable length planned for completion in so short a time. With a reasonable amount of favorable breaks, it is hoped that a standard-design road completed at least to a dry gravel surface condition throughout the Highway and its two branches may be available before another New Year comes around."

Equipment Maintenance Plays Big Role in War

For many years, this publication has stressed the importance of the proper care of equipment to increase its working life, protect the investment in expensive machines, and produce profits on the job. Today, maintenance has taken on a much greater importance to conserve vital materials and keep machines working for Victory.

As an example of the importance of equipment maintenance, all orders for equipment placed by the Army, Navy and other governmental agencies incorporate definite specifications covering instruction books on the use and care of the machines ordered. These instruction books are usually made up in three sections: Operation, Maintenance, and Repair Parts, with descriptive illustrations. The books must contain not only a complete description and instructions concerning the machine itself but also of all parts, including those furnished by other manufacturers. The books must be approved by the government agency placing the order for the machines before printing.

While most manufacturers have in the past put out manuals on their equipment, they have rarely furnished instruction books as complete as those required by government agencies. In general, the book must be written on the assumption that the person who is to use the equipment has no mechanical background or previous training in its use, which requires a new approach to the subject.

Jaeger Machine Co., Columbus, Ohio, points out these new features in its instruction books and states that it intends to broaden the scope of the books, which now refer to one specific unit only, as soon as time permits and to make them available generally because of their potential usefulness in the construction field.

Bridge Design Contest Winners Are Announced

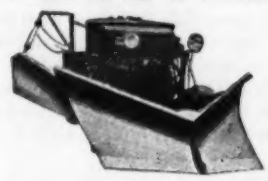
The winners in the Annual Students' Bridge Design Competition have been announced by the American Institute of Steel Construction, as follows: first prize, $200, George W. Russell; second prize, $100, N. Clifford Prall; and third prize, $50, Curtis D. Hicks. All three are students at Iowa State College. Certificates of honorable mention were awarded to John R. Leary, Pennsylvania State College; and Charles R. Vosburg, W. David Frevert, Robert Lueder, and Clarence F. Rost, all of Iowa State College.

The subject of the design for this year's competition was a steel grade-separation structure carrying a highway over a four-track railroad, a navigable canal, and a dual four-lane highway to which there are connections with the overhead crossing.

The Jury making these awards included Hugh Ferriss, Architect; Arthur C. Holden, Holden, McLaughlin & Associates, Architects; F. A. Burdett, Consulting Engineer; Howard Myers, Editor, The Architectural Forum, all of New York City; and Morris Goodkind, Bridge Engineer, New Jersey State Highway Department.

Be careful—lost time due to accidents on the job is time working for the enemy. Save manpower for warpower.

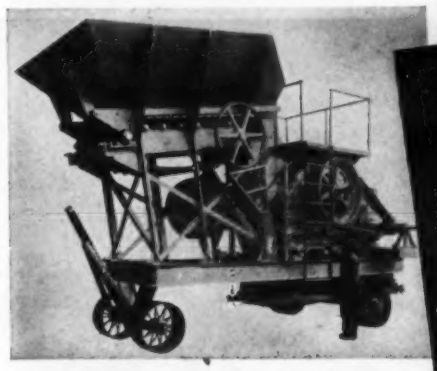
ACT NOW! ON NEXT WINTER'S REPAIRS *for* DAVENPORT-FRINK SNO-PLOWS



You can't start too soon to think about keeping your highways open next winter. Check over your repair requirements, then place your orders EARLY. We'll do the best we can for you. Priorities are required and higher priorities are demanded on some parts than on others. By acting promptly you may be able to avoid the cost and inconvenience of snow-blocked roads. Delay may mean disappointment.

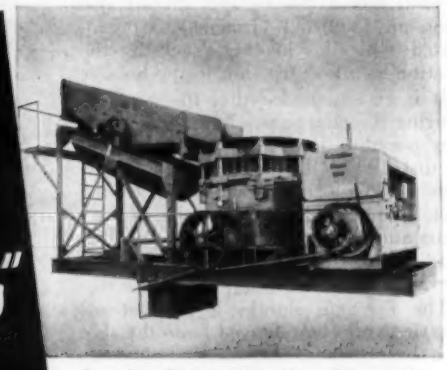
DAVENPORT BESLER CORPORATION Dept. A Davenport . . . . . Iowa

Made in Eastern U.S.A. by CARL H. FRINK, 1000 Islands, CLAYTON, NEW YORK



Primary Unit of large Telsmith Portable Crushing-Screening Plant, including Apron Feeder, Primary Jaw Crusher, power unit and conveyor.

NO "Boots" or "Yardbirds" HERE!



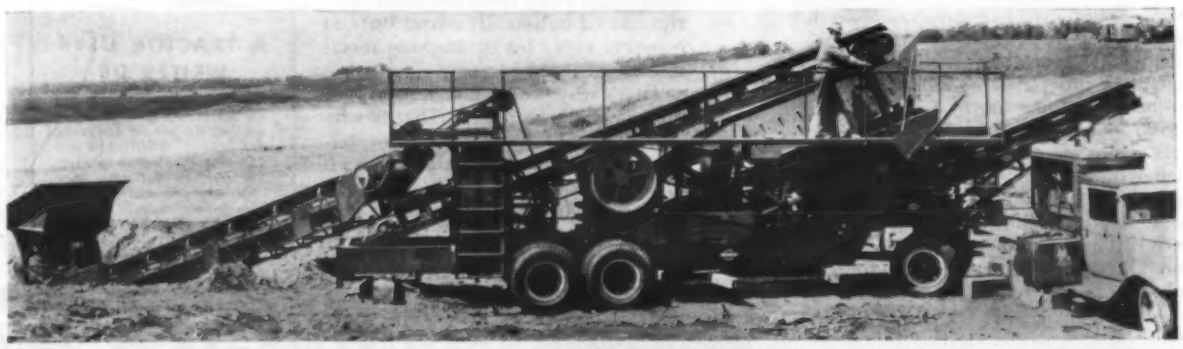
Secondary Crushing Unit of large Telsmith Semi-Portable Crushing-Screening Plant, including Scalping Pulsator Screen, No. 48 Gyrasphere Secondary Crusher, and power unit.

TELSMITH

Portable Crushing-Screening Plants are *Overseas Veterans* in Uncle Sam's Armed Forces

★ They're no rookies, these Telsmith Portable Crushing-Screening Plants. They finished "recruit training" in the armed forces long before Pearl Harbor. Telsmiths helped to build naval bases and docks, air bases, runways and aprons for flying fields, military highways and access roads over here. Then when the sailors, soldiers and marines went overseas, Telsmith Portables shipped out with 'em. They are serving on the first fronts, and on "the second front." And they're still going over. Like you road builders and contractors, Uncle Sam and his nephews, and the United Nations, too, appreciate Telsmith Portables. They turn out the aggregate *fast*—and economically—on large or small jobs. Their output is bigger; their sizing finer. Find out all about 'em, *get Bulletin P-34.*

Complete Telsmith Portable Dual Crushing-Screening Plant P-7



SMITH ENGINEERING WORKS, 4014 N. HOLTON STREET, MILWAUKEE, WISCONSIN

Cable Addresses: Sengworks, Milwaukee—Concrete, London

Room 1604—50 East 42nd St. New York City
211 W. Wacker Drive Chicago, Ill.
713 Commercial Trust Bldg. Philadelphia, Pa.
19-21 Charles St. Cambridge, Mass.
G. F. Seeley & Co. Toronto, Ont.
Mines Eng. & Equip. Co. San Francisco—Los Angeles
Brandeis M. & S. Co. Louisville, Ky.
Charleston Tractor & Eqpt. Corp. Charleston, W. Va.
Roanoke Trac. & Eqpt. Co. Roanoke, Va.
Clift L. Priester 911 S. 3rd St., Memphis, Tenn.
Wilson-Wessner-Wilkinson Co. Knoxville and Nashville, Tenn.

Loading Practices For Safer Blasting

(*Continued from page 30*)

loading of the shot should be kept away from it. This applies to curious visitors as well as idle workmen.

The management should designate some competent person to be in charge of all blasting operations, and this person should be given sufficient authority to make sure that his instructions will be obeyed. He should be authorized to order any employee from the scene of a blasting operation if this individual insists on following unsafe practices or is under the influence of liquor or narcotics. It should be his responsibility to keep an accurate account of all pertinent data in reference to the loading of the shot. This should include the depth of holes, the amount of explosives in each charge, and the position of the decks and the points at which stemming starts in each hole. His records should also show any unusual circumstances connected with the loading, such as the location of an obstruction in the hole.

It is recommended that the work of figuring the charge per hole, and whenever possible, the bailing of holes and the distribution of stemming, be done before the explosive is delivered to the shot. This will reduce the man-exposure hours and allow the foreman to give full time to the supervision of the loading operations.

The foreman should insist that all electric cables be removed from the shot area before loading is started. No one should be allowed on the quarry floor in front of the proposed blast during the loading operation. If a blast consists of a combination of well-drill holes and snake holes, the snake holes should be completely loaded before starting to load the well-drill holes.

Premature Explosion

When dynamite is delivered to the location of the shot, the cases should be placed carefully on the ground in neat piles at designated points. These piles should be arranged so that if one of the holes being loaded should explode prematurely, the explosion is not likely to propagate to the piles on the top of the ground. It is recommended that the main piles of explosives be located at least 150 feet back from the row of holes. The unopened cases should be carried to an opening station not closer than 25 to 50 feet from the line of holes, this distance to depend upon the charge per hole. For instance, if the charge is less than 200 pounds, 25 feet should be satisfactory.

However, regardless of the load, the supply at the opening station should never exceed 400 pounds and the opening stations should be located at least 50 feet apart. Hard-wood or non-metallic tools, such as wedges and mallets, should be furnished and no one allowed to open wooden cases except with these implements. If fibreboard containers are used, they should be opened with the usual patent cutters or slitters which are designed for this purpose, and which may be obtained at any hardware or ten-cent store.

As a further precaution toward minimizing the damage from the premature explosion of a hole during loading, the loading crews should be separated by as much distance as practical and never less than 35 feet. Suppose you are loading an eight-hole shot with two loading crews and the spacing between holes is 15 feet. One crew should start at hole number 1 and the other at hole number 5, and both work in the same direction. In this case the two crews should remain 45 to 60 feet apart without difficulty.

The opened cases should be carried to a point about 6 feet from the hole at such a rate that not over two cases are at the hole at any one time.

Undoubtedly some of these recommendations will not be feasible in certain locations, as the only practical way to set up safety blasting regulations is to consider each individual operation on its own merits.

If electric blasting caps are to be used for priming the holes, they should not be piled with the dynamite, but should be located about half-way between the opening piles. They should be kept in the original cartons until needed and the foreman of the loading crew should be responsible for their distribution. The placing of two caps in the main charge and one in each deck is recommended. The caps in any hole containing two or more charges separated by stemming should be connected in series.

When Primacord is used, the line should be cut from the spool as soon as the primed cartridge has been properly seated and the spool should be taken to the next hole to be loaded. The end coming from the hole should be drawn taut and securely fastened at one side where it will neither interfere with loading nor come in contact with the dynamite on top of the ground.

If the holes are unusually rough or ragged, the Primacord or electric blasting cap should be placed in the first cartridge to go into the hole. Then, if the hole becomes blocked with a rock during loading, there is an excellent chance of detonating the bottom load, which would otherwise probably remain unexploded in the wall. The danger of such unexploded charges to personnel

(*Continued on next page*)

The **WELLPOINT INDUSTRY**

has made its contribution to the war effort. Read about it in this Victory Bulletin—yours for the asking. The bulletin tells by word and picture how wet excavation is converted to dry excavation, saving sheeting and cofferdams. On small or large projects, Wellpoint equipment assures speed and economy during excavating and subsequent operations.

FOR SALE OR RENT

JOHN W. STANG CORP.
NUMBER TWO BROADWAY, NEW YORK CITY
also 2322 Newton Avenue, San Diego, Calif.

HELP MAKE BULLETS

The munitions of war are not made in their entirety in arsenals. They are partially produced in the forests, on the farms, in the mines. Without your products the war plant could not function. And, every piece of machinery you obtain as new equipment or for maintenance takes just that many man hours away from the actual fabrication of bullets. It's your duty to conserve every bit of working metal that is entrusted to you.

That's why proper Lubrication is of vital importance today. That is why LUBRIPLATE lubricants are attracting so much attention. LUBRIPLATE actually conditions bearing surfaces and arrests progressive wear. It prevents rust and corrosion and reduces power consumption. It possesses characteristics not found in conventional lubricants.

A TRACTOR USER WRITES US

"During the past three years we have handled over 25 million dollars in construction jobs. LUBRIPLATE has not only enabled us to keep our tractors and other machinery continuously on the job—but has reduced our upkeep cost at least 60 percent."

Take just one piece of equipment, your tractor. Just think what it would mean to you if you could double or treble its life, reduce replacement of parts and avoid unnecessary interruptions of service. That is what scores of tractor users are accomplishing with LUBRIPLATE.

Your investment in machinery of all kinds is certainly great enough to warrant your investigation of LUBRIPLATE. Write today for a copy of "The LUBRIPLATE Film" written especially for your industry.

LUBRIPLATE DIVISION
FISKE BROTHERS REFINING COMPANY
NEWARK, N. J. **SINCE 1870** TOLEDO, O.
WRITE FOR THE NAME OF THE DEALER NEAR YOU

Freeing Blocked Holes When Loading Dynamite

(Continued from preceding page)

and equipment cannot be overemphasized.

When the holes contain water, the cartridges should be lowered until they build up above the water level, after which it is satisfactory to drop them, provided the holes are reasonably smooth. If the holes are rough so that there is danger of hanging the cartridges up before they reach bottom, or of blocking the holes by dislodging rocks from the side, time will be saved by lowering the entire load.

A tamping block on the end of a rope is sometimes necessary for tamping explosives in well-drill holes. The block should be of hard wood to resist wear and weighted with a non-sparking metal so that it will sink in water. It should not have any exposed metal parts, or be too heavy for ordinary everyday use. It is operated by lowering into the hole until it rests on the dynamite, then raising it a foot or two and letting it drop.

Wagon-drill and snake holes of course require that the cartridges be slit and tamped. Wooden tamping poles with no exposed metal parts should be used and the ends should be cut off squarely in order to work efficiently. It is recommended that the dynamite be slit at or near the hole as it is needed. This will prevent scattering the dynamite over a large area of ground or the possibility of slitting too much so that it must be sent back to magazine where it may absorb moisture and become insensitive.

In the interests of safety, dynamite should, whenever possible, be loaded in the wrappers as received from the manufacturer. This can usually be done if sufficient thought is given to the relationship between the diameter of the hole and the diameter of the cartridge before the order is placed. This does not of course refer to the free-running type of dynamite which is designed to be poured into the holes. If the holes are so rough that they will probably be lost through the loading of cartridges as manufactured, it is of course necessary to shuck the dynamite. This requires the exercise of care to prevent dynamite being scattered around the collar of the hole. When the condition of the holes makes it necessary to cut gelatin into small pieces in order to prevent blocking the hole, the operation should be done with a sharpened wooden paddle in an empty dynamite box in order to prevent mixing grit with the dynamite.

Blocked Holes

Sometimes, in spite of all these precautions, holes will become blocked, and the treatment of those holes often presents a definite hazard. The use of the usual tamping dolly may merely pack the obstruction tighter and pave the way for more violent and more dangerous measures.

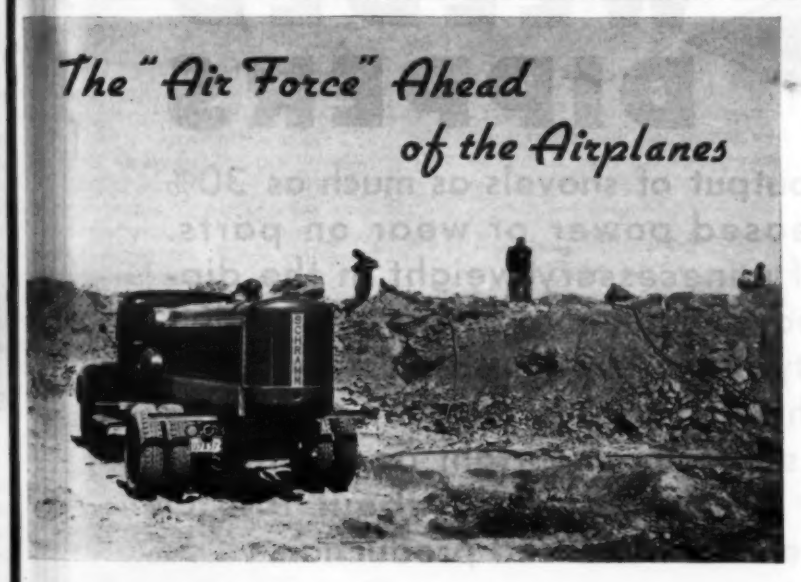
A much more satisfactory block for freeing a plug of dynamite may be made from a 10-foot piece of 2 x 4. The lower 4 feet should be cut down to 2 x 2 or smaller and the bottom 4 inches made into a sharp point. It should be lowered into the hole until it rests on the stuck cartridge and then moved carefully up and down. In most cases it will break up the cartridge so that it may be dislodged by the shoulder of the block. Always use extreme care in this operation. It is advisable to pour some water down the hole before starting to dislodge a cartridge and at intervals during the operation. Never put any metal implement or even a wooden tamping block tipped with metal into a bore hole containing explosive. When surface conditions permit, heavy tamping blocks in deep holes may be operated through a tripod erected over the hole. This will make it unnecessary for the men operating it to stand directly over the hole.

When tamping blocks are being used, no explosives should be allowed on the surface within 10 feet of the hole. On removal from the holes, tamping blocks should be rested on box-lining paper or in empty dynamite cases to prevent gravel and grit being introduced into the hole. Do not operate a tamping block too vigorously as this may injure the Primacord or electric blasting cap wires.

If the hole has become blocked by a

(Concluded on page 54)

The "Air Force" Ahead of the Airplanes



GIVE 'em air and they'll get things done in a hurry. . . . Whether it's building a flying field in Alaska or chipping a casting in Cairo you can depend on SCHRAMM all-weather compressors to deliver unfailing power to the tools.

Because these compressors are 100% water-cooled (not half-and-half), their performance is unaffected by outside temperatures—no sticking, no overheating, and correct lubrication at all times. Schramm's straight-lined design saves much critical material and, without sacrificing either power or stamina, they weigh as much as 40% less than others of equal capacity.

GASOLINE—DIESEL—ELECTRIC

You know which size, type and drive is best suited to your requirements. Schramm knows best how to build it. For back of every compressor bearing our name are 42 years of engineering and research.

Send today for new Catalog—Illustrations, facts, figures and prices. All the information you need before deciding on the type and size best suited to the job on hand. . . . Priorities allocated to government jobs assure prompt delivery.

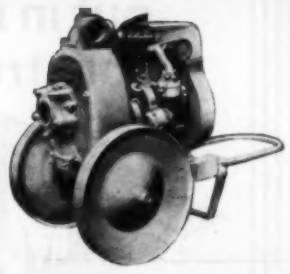
SCHRAMM THE COMPRESSOR PEOPLE INCORPORATED WEST CHESTER, PENNA.

In PUMPS, the BEST COSTS YOU the LEAST

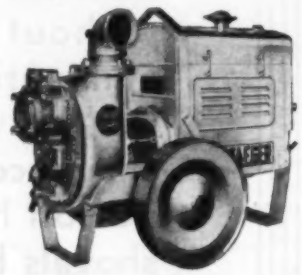
CERTIFIED HIGH PERFORMANCE

Every Jaeger Pump is Individually Tested and Guaranteed for Vacuum, Capacity and Pressure

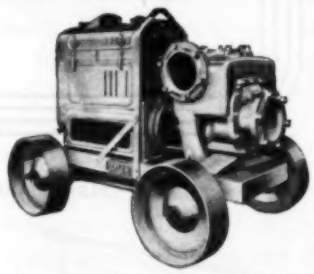
THOUSANDS of EXTRA HOURS of SERVICE for Your Future Protection as Well as Profit



2" AND 3" HEAVY DUTY PUMPS: Finest engineered small pumps — stand high pressures, continuous heavy service.



4" AND 6" PORTABLE PUMPS: Big capacity (up to 90,000 G.P.H.) and years of service in compact, easy handling units.



8" AND 10" BIG CAPACITY PUMPS: Huge air and water capacity (125,000 to over 200,000 G.P.H.), plus unequalled compactness and portability.

7 Reasons Why Jaegers Outlast and Outperform Other Pumps:

1. HIGH PRESSURE SHELL, of gas'd cell-cleaning design.
2. REPLACEABLE LINERS.
3. PAT'D PRIMING JET, gives up to 5 times faster pure-priming.

4. HI-HEAD, HI-CAPACITY IMPELLERS (of steel in 4" to 8" sizes).
5. OVER-SIZE SHAFTS of heat-treated chrome nickel.
6.

"LONG-LIFE" SEAL — accessible for inspection.
7. DIRECT DRIVE, ALWAYS IN ALIGNMENT — adds life to pump and engine.

JAEGER

"SURE-PRIME" PUMPS - - MIXERS - - HOISTS

Manufactured by THE JAEGER MACHINE COMPANY 708 DUBLIN AVENUE, COLUMBUS, OHIO

"K-A-Z-Z Calling" Maintenance Cars

Maintenance Division of The Kansas State Highway Commission Uses a Short Wave Radio in Emergency

✦ SITTING in his office during a snow storm or in time of flood, L. L. Marsh, Maintenance Engineer of the Kansas State Highway Commission, can talk directly with cars of Division Engineers, as well as with the State Highway Patrol, so that emergency maintenance work, or a quick shift in the policing of the highways, can be carried out to protect highway traffic. The installation of the 2-way radio system had just started when war needs cut down the availability of parts for civilian use. However, a 500-watt transmitter, KAZZ, licensed by the Federal Communications Commission as an emergency station and operating on 1,698 kilocycles, has been built and is in operation with great success.

Present Installation

The present installation includes the transmitter at Topeka which will cover the eastern two-thirds of the state and a smaller transmitter at Norton in the northwest corner of the state. The transmitter in Topeka was built by the NYA with parts bought by the State Highway Commission. The radio school of the NYA has profited greatly by this demonstration and has turned out many qualified radio technicians as a result. The school furnishes a 24-hour monitor service over the installation as a part of its training, as a licensed operator is required. A 95-foot tower at the First Division Office in Topeka is used for the antenna.

The master station at the Maintenance Engineer's office is a remote receiver and transmitter in that it is connected with the transmitter by wire and the Maintenance Engineer may cut in on any conversation which is heard over the receiving loudspeaker and give directions. Further, by using a switch, he can begin broadcasting at any time. His car and those of the Division Engineers are equipped with the 2-way radios but the distance of operation of the transmitter in the car is limited to about 30 miles because of the power available.

Plans for Expansion

As radio parts are released for civilian emergency use, the state plans to continue to purchase additional equipment for the NYA to build into sets, with labor at no cost to the state. These will be used to equip all of the cars of the six Division Engineers first and then each of the six Division Field Engineers and the twenty-seven District Maintenance Supervisors' cars in each District. There will be a 150-watt transmitter in each of the Division points, except Topeka where the main transmitter is located. If necessary to convey a message from the central office to a distant part of the state where the main transmitter will not reach, then the message can be relayed by one of the intermediate stations.

C. & E. M. Photo
L. L. Marsh, Maintenance Engineer, Kansas State Highway Commission, talking with a District Engineer in the field through Station KAZZ. This two-way radio saves time and lives in handling emergency maintenance work.

Services Rendered

This is probably the first state where the highway department has been ahead of the highway patrol in having radio equipment. There has been very close cooperation between the highway department and the patrol in the use of the transmitter. Emergency messages are transmitted frequently to the patrol cars, all of which are equipped with receiving sets.

The value of the radio has been demonstrated during times of flood or snow storm. When a bridge has been washed out by one of the floods such as Kansas has experienced frequently during the last two years, following the long "Dust Bowl" experiences, it is necessary to detour traffic and to do it immediately and with show of authority. The maintenance men are all in overalls which are not exactly badges of authority. Although they may show credentials as evidence of authority, it has not the instant effect of a

(*Concluded on page* 63)

TAKE GOOD CARE OF YOUR

HERCULES IRONEROLLERS

Keep hydraulic system filled with proper oil, and free of air and dirt. Send for HERCULES Care and Operation Bulletin H-3713.

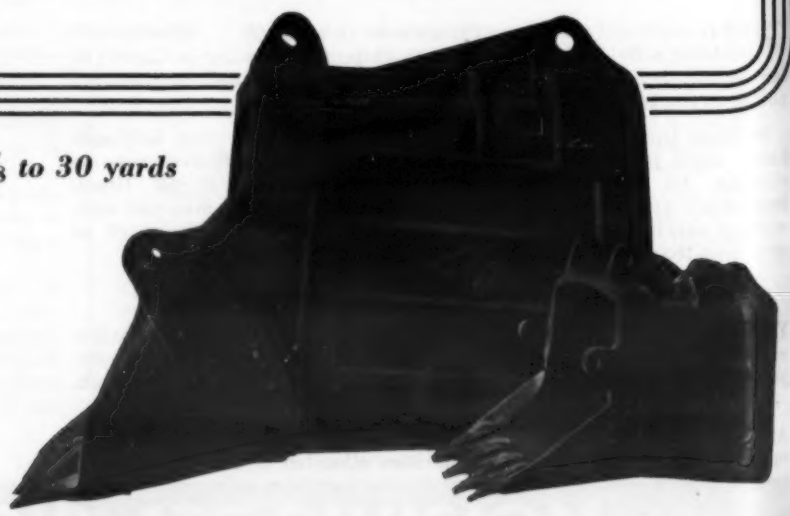
THE HERCULES COMPANY MARION ~ OHIO

Our Country expects increased output in iron mines, coal strip mines and construction work to help win the war

PMCO **WELDED DIPPERS**

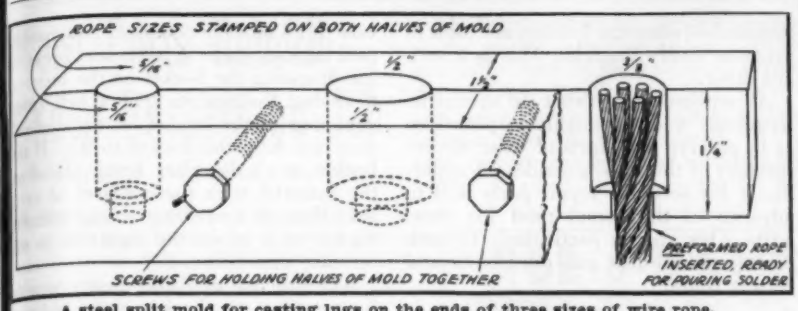
Increase the output of shovels as much as 30% without increased power or wear on parts. Elimination of unnecessary weight in the dipper, by welded construction, makes this added shovel capacity. At no time in the history of our nation has the efficient operation of power shovels been so vitally important as it is today. Consult your shovel engineer about PMCO Welded Dippers for increased production.

Sizes from 3/8 to 30 yards



We operate the largest and most complete manganese steel foundry in the United States.

PETTIBONE MULLIKEN CORPORATION
Established 1880
4710 West Division Street, Chicago, Illinois



A steel split mold for casting lugs on the ends of three sizes of wire rope.

Handy Way To Cast Wire Rope End Lugs

A very simple method of casting a lug of solder onto the ends of wire ropes has been developed by Kearney & Trecker Corp. of Milwaukee, Wis. This company has adopted the practice of casting the lug of solder onto the ends of many of the ropes, the only exceptions being some of the hoist ropes, which are ended in a basket-type socket, and some of the slings in which the end of the rope is spliced into the rope body to form an eye or bight.

The soldered lug serves several purposes. First, it eliminates the exposed ends of the wires, which are a source of injury and infection to riggers and others handling the rope. Second, it serves as a means for readily attaching hoist ropes to the drums of overhead traveling cranes, as it would on many pieces of construction equipment. Third, where ropes are fastened by clips, the lug on the rope end provides an additional safety feature so that if the rope should slip, the last clip will catch the lug and hold the rope.

Because of its ease in handling, lack of tendency to fly apart, and its resistance to fatigue, preformed rope is being used by Kearney & Trecker Corp. for all crane and hoist ropes and for many of the slings. Since this rope requires no seizing at the ends to hold the strands in position, it lends itself better to the casting of solder lugs on the ends. For this purpose C. R. Hochmuth, Assistant Works Manager, Kearney & Trecker Corp., reports that they have made some split molds of steel, similar to the ones shown in the diagram. These molds are provided for each size of rope used. The two sections of each mold are held together by two screws passing through one section of the mold and into the other. The mold shown will accommodate three sizes of rope, each size being stamped on the mold by means of punches.

To prepare the end of the rope, the strands are unlayed for about an inch and the hemp center is cut back the same distance. The unlayed strands are then cleaned of lubricant and grime by dipping them into a half-and-half solution of commercial muriatic acid and water. The rope should not be inserted so deep that the acid will get on the hemp center. The strands are then tinned by dipping them into molten solder. It may be necessary to dip in acid and solder several times before a good tinning job is obtained.

By bunching the strands together they are passed through the bottom of the mold, and then are spread out, after which hard solder is poured into the mold. After the solder cools, the screws holding the mold together are removed, allowing the two mold sections to be separated so the rope with the attached lug of solder can be removed.

To eliminate sharp edges, which might cause scratches or cuts to the hands of those handling the rope, the edges of the lug are filed slightly round.

Where solder lugs are to be applied to ordinary or non-preformed rope, it is necessary to apply a seizing of soft wire to the rope at a point just below the bottom of the mold, to prevent the strands from raveling. The seizing must be applied before the strands are opened up, and it should be followed by another seizing an inch or so below the first. After the lug is cast, the seizings may be removed.

New Edition Released Of Cement Standards

The Sixth Edition of the A.S.T.M. Standards on Cement, issued annually by the American Society for Testing Materials, furnishes in compact form all of the latest standard and tentative specifications, methods of chemical analysis, and methods of physical tests pertaining to cement. This edition includes the Emergency Alternate Specifications for Portland Cement (EA-C 150), issued in the interest of expediting procurement, and, for the first time, the Tentative Specifications for Treated Portland Cement for Concrete Pavements (C175-42 T). A manual of cement testing and a list of selected references for portland cement are also given.

This 125-page publication in heavy paper binding can be obtained from the A.S.T.M. Headquarters, 260 S. Broad St., Philadelphia, Pa., at $1.35 per copy; or for $1.10 per copy on orders for 10 to 49 copies.

Get More Production From Electric Tools

Portable electric tools are important factors in the maintenance of construction equipment, as well as in war production emergencies. Black & Decker Mfg. Co., Towson, Md., has just issued a book, "They Used Their Heads", telling how production experts have adapted Black & Decker and Van Dorn portable electric tools to emergency war uses. This book contains illustrations and many ideas which can be helpful to contractors and highway departments in getting more out of their present tools.

Copies of this 16-page book may be secured direct from Black & Decker.

New General Manager Is Named by Cummins

Several changes in executive personnel have been announced by the Cummins Engine Co., Columbus, Ind., two of them created by the resignation of J. I. Miller, Vice President and General Manager, to accept a commission as Lieutenant in the U. S. Naval Reserve.

V. E. McMullen, former Works Manager, has succeeded Lt. Miller, now on active duty, and Carl R. Fox has advanced from Assistant Works Manager to take over Mr. McMullen's former position.

Two Model 3815 Carver pumps in tandem on the well-point suction line at a Minnesota sewage project — Oakes Bros. Construction Company, contractors.

FROM drafting board to final tests, Carver pumps are in the hands of men who *know* what pumps must do *on the job.* Every design feature, every bit of material selected, every step of manufacture is aimed toward building the kind of pump that delivers the *most* out of every hour on the job—and that *stays* on the job for hundreds of *extra* hours.

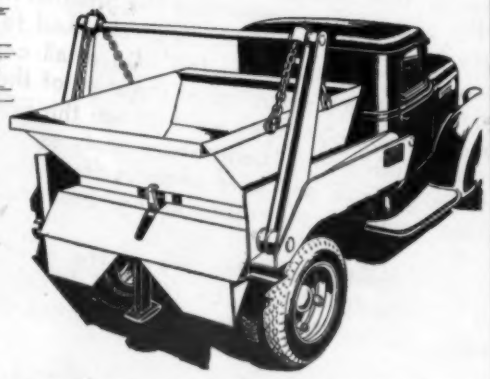
Carver's simplified design with fewer wearing parts, Carver's time-defying Lifetime Seal, and Carver's longer-lasting impeller and removable liner are but a few of the features that make these outstanding centrifugals winners against old Father Time.

Get the facts . . . your Carver distributor will gladly furnish full information on the *complete* Carver line, or write directly to:

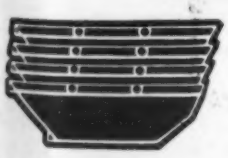
THE CARVER PUMP CO.
Muscatine, Iowa

CARVER CENTRIFUGAL Certified PUMPS

Idle Trucks don't win Wars



BROOKS LOAD LUGGER



One-piece, welded buckets. Can be nested for hauling empty on hurry-up jobs.

Write for Catalog No. 44.

TIME is vital for victory . . . so why waste it by waiting around for each truck to be loaded by hand, when you can use the Brooks LOAD LUGGER System and "keep 'em rolling" all day long. Truck-mounted LOAD LUGGERS with detachable "bodies" operate *continuously* . . . picking up each bucket as fast as filled, hauling away for dumping, and spotting it back on the job for re-loading. This is a quick, profitable method of handling contract jobs for moving materials or supplies, fuel or ashes, by-products or small finished pieces, as castings or forgings.

704 Davenport Road, Knoxville, Tenn.
Distributors in all Principal Cities

Brooks EQUIPMENT AND MFG. CO.

Proper Bucket Care Adds to Service Life

(*Continued from page 35*)

ganese-steel rod was applied to fill in around the bars and to round out the shape. The space between the teeth was built up similarly. Where the lip is thick and much metal had worn away, a piece of manganese steel cut from scrap was used to make a "backer". This was welded in place, providing the preliminary shape and several round filler bars were placed on the outside to make up the thickness and for reinforcement. A filler bar was tacked on the edge of the outside tooth bases to protect the rest of the tooth bases, retarding wear at that point.

The heel was built up at the corners, using four or five round or square bars bent cold, tacked on, and welding rod used to fill in between so as to present a heavy pad to take the wear. The latch-keeper was built up similarly.

Incidentally, after the worn teeth are reconditioned, as indicated above, the addition of a suitable hard-surfacing material will aid in prolonging the life of the tooth. This also applies to new teeth. If the teeth are operating in well-shot and fragmented material, or clay, sand and gravel, a hard-surfacing rod having a Brinell of between 500 and 600 should be used. However, if the digging is tough, and a lot of impact occurs to the teeth, a self-hardening type of electrode having a Brinell of between 450 and 550, which will stand impact to a much better degree, should be used.

Last but not least, when entering orders for new repair parts for your dippers, buckets, or any other part of your shovel or crane, see that the used or worn parts are turned in to your distributor for inspection. In many instances, the distributor may be able to salvage the old part by various reconditioning processes. Perhaps an exchange may be arranged on the worn part, or the scrap price on the worn part may be allowed. *Keep* your worn parts if you can recondition them to give reasonable service. This is in accordance with the nation-wide program to "turn in the scrap".

Clamshell and Orangepeel Buckets

Fantastic as it may seem to the user of digging and material-handling buckets, when trouble arises with buckets, particularly clamshell buckets, on the job, it is usually due to lack of proper lubrication, and to neglect.

Greasing is the important thing necessary to keep the moving parts of a bucket from undue wear. Lubricants of the proper quality should be applied to the right points in the buckets as well as to the operating ropes. Lubrication should not be left to the decision of the crane runners. The manufacturers of digging equipment are glad to make suggestions as to the sort of lubrication to be used at various points in the buckets and on the rope and their suggestions should be followed. Every moving part on a bucket, as well as any other piece of machinery, wears more rapidly when not properly lubricated. Thus, pins, sheaves, bushings, etc., on buckets should be given proper attention.

Chains that are used in buckets for closing them, or even for lifting purposes, should also be copiously and regularly lubricated. The disposition on the part of some bucket operators is to omit lubrication when the buckets are used in gritty or sandy material. This is a serious error.

All equipment of this type should be frequently and thoroughly inspected so as to observe the effects of wear. An inspection of this kind provides an opportunity for securing repair parts well in advance of the actual need for these parts. This applies particularly to such things as bushings and pins, teeth and cutting edges.

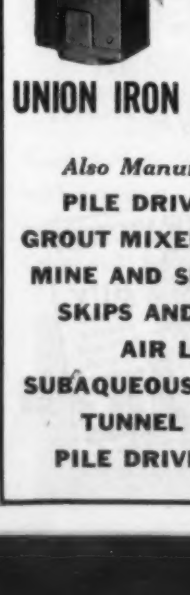
All mechanical digging machinery is so proportioned as to withstand wear for a considerable length of time. A complete breakdown seldom occurs through faults in design, but it does occur through neglect in the matter of replacing parts which are subjected to severe wear. Cutting edges and teeth in particular should be closely watched and they should either be repaired by building up, or by replacing them before they become useless.

Abuse of buckets must be avoided. There is no point in using buckets as battering rams or as pile drivers. In the case of all modern clamshell and orange-peel buckets, there is never any occasion for dropping the bucket on the material to be dug. Contrary to general belief, this dropping of the bucket on the material does not help the bucket to dig. If the bucket won't dig after being placed on the material with some degree of care, then there is something wrong with the bucket or it is not the right one to use on that material.

The practice of lifting heavy weights by means of the bucket itself, and particularly beyond the capacity of the bucket, should be avoided. If the bucket is not a suitable one for the work in hand, no attempt should be made to force it to do the work, but instead the correct bucket for that particular job should be used. Buckets of the shovel, dragline or grab types should be considered as tools. The best operating machine is valueless if an improper tool is being used.

Repairs to equipment of this kind cannot always be done by the original man-

(*Continued on next page*)



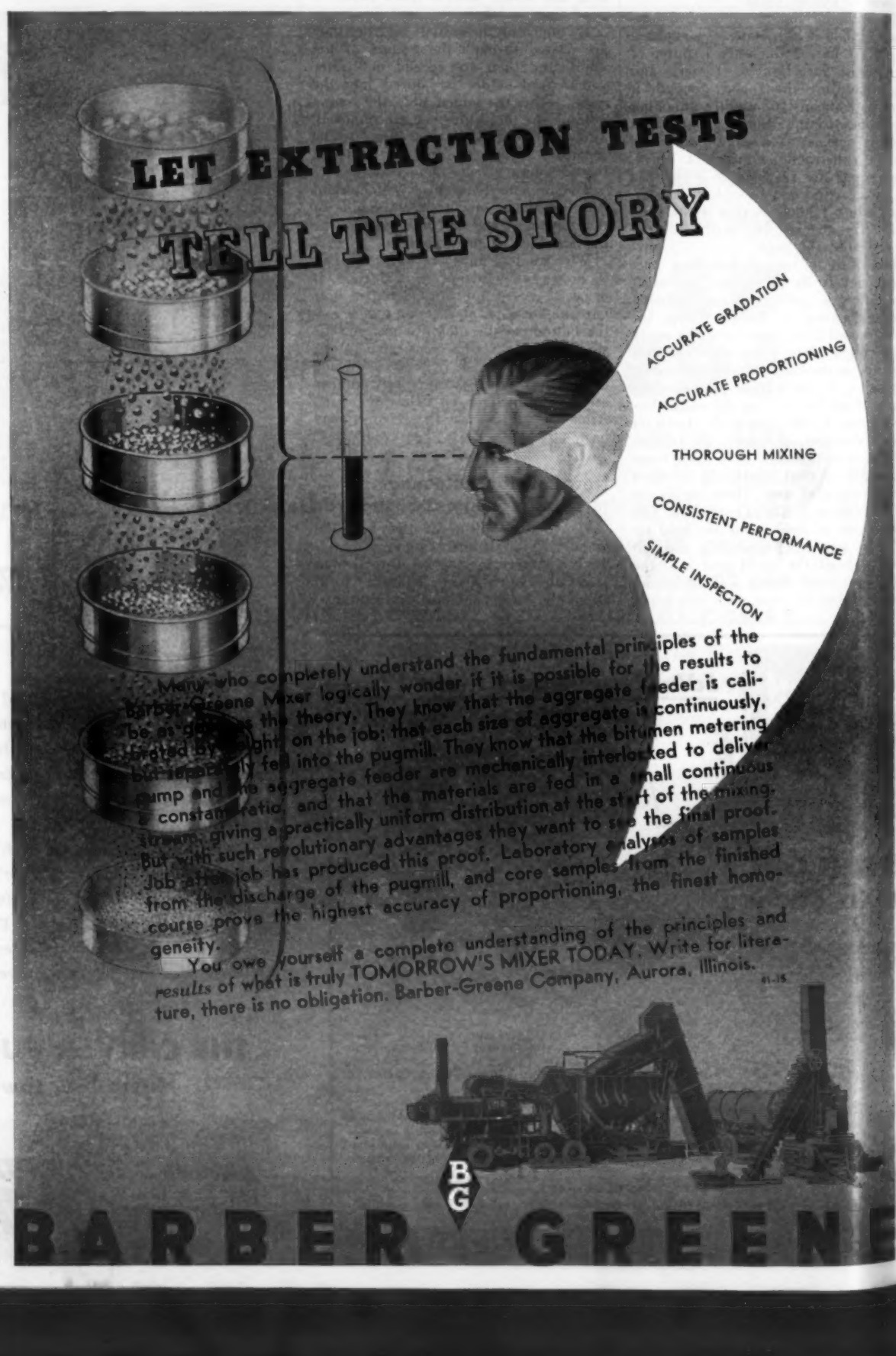
UNION PILE HAMMERS

Write for Bulletin

P. O. Box 18
Elizabeth, N. J.

UNION IRON WORKS, Inc.

Also Manufacturers of
PILE DRIVER LEADS
GROUT MIXER and EJECTOR
MINE AND SHAFT CAGES
SKIPS AND BUCKETS
AIR LOCKS
SUBAQUEOUS EQUIPMENT
TUNNEL SHIELDS
PILE DRIVER HOISTS


LET EXTRACTION TESTS
TELL THE STORY
ACCURATE GRADATION
ACCURATE PROPORTIONING
THOROUGH MIXING
CONSISTENT PERFORMANCE
SIMPLE INSPECTION
Many who completely understand the fundamental principles of the Barber-Greene Mixer logically wonder if it is possible for the results to be as good as the theory. They know that the aggregate feeder is calibrated by weight on the job; that each size of aggregate is continuously, but separately fed into the pugmill. They know that the bitumen metering pump and the aggregate feeder are mechanically interlocked to deliver a constant ratio, and that the materials are fed in a small continuous stream, giving a practically uniform distribution at the start of the mixing. But with such revolutionary advantages they want to see the final proof. Job after job has produced this proof. Laboratory analyses of samples from the discharge of the pugmill, and core samples from the finished course prove the highest accuracy of proportioning, the finest homogeneity.
You owe yourself a complete understanding of the principles and results of what is truly TOMORROW'S MIXER TODAY. Write for literature, there is no obligation. Barber-Greene Company, Aurora, Illinois.
41-15
B G
BARBER GREEN

Worn Parts Rebuilt Keep Buckets on Job

(*Continued from preceding page*)

ufacturer but, wherever it is possible to do so, the job should be done by the manufacturer. When this is impossible, it is wise to consult him as to the repairs contemplated and get his advice as to the material to be used and the manner in which the job should be done.

Repairs should be made in well-equipped and competent shops. Temporary or "jury" jobs of a makeshift character do not pay, and frequently harm the equipment. Care should be exercised in keeping in stock necessary repair parts to the manufacturers' standard. If such parts are not used, the bucket will become an orphan and the manufacturer's original records which he uses for reference in supplying repair parts then become valueless.

Whenever a doubt arises as to any question of repairs, maintenance, or the usefulness of digging buckets, the question should be taken up immediately with the manufacturer of the bucket. In writing for such assistance, be sure to give the manufacturer ample description of the conditions. He will be willing to help but should not be compelled to guess what the trouble is.

The wear to teeth is an item worth serious consideration. Here replacements are sometimes needed due to breakage and wear, but no difficulty is encountered in replacing these parts. Bucket users should keep tooth bolts tight at all times to prevent breakage of both teeth and bolts. Teeth should never be allowed to wear down so that the points are dulled.

Lips wear especially on material-handling buckets due to excessive abrasiveness of some of the materials handled. It is a small job to replace worn-out lips with new parts where replaceable lips are a feature of the bucket. On clamshell buckets, wear usually occurs first at the corners, and if the bucket is handling fine aggregate and sand, the efficiency of a bucket is considerably reduced by materials sifting through the corners. Bucket lips can be made to wear uniformly if the four corners are built up and reinforced with hard-surfacing material on the inside. The hard-surfacing material should be applied in a triangular pattern extending 6 inches up the sides and across the front of the bucket corners.

Dragline Buckets

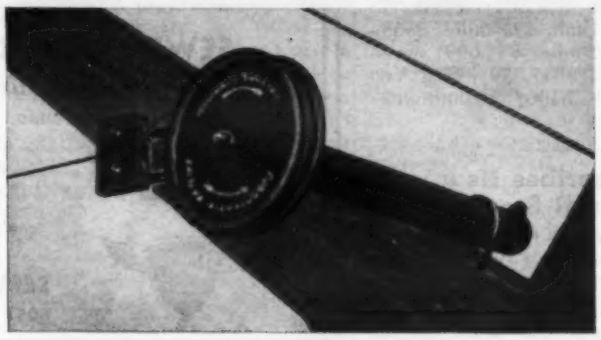
While there is a tremendous variation in the abrasive action to which dragline buckets are subject in different locations and materials, the life of a bucket is measured mostly by the kind and quality of the maintenance given to it. With good supervision closely cooperating with the dragline runners, maintenance work is done before actual destruction or deep wear has occurred in the buckets. Nowhere is the adage "A stitch in time saves nine" more apt. If the skids of the dragline bucket are hard-surfaced before the bucket is actually placed in operation it then becomes a small job to re-hard-surface the skids as wear occurs.

The corners of the lip, the cutting edge of the bucket, are vital points. These two points may be hard-surfaced before the bucket is placed in service. By occasionally hard-surfacing these points, extreme wear can be prevented. However, if wear should occur to the point where it affects the strength of the bucket, rectangular or flat-nickel-manganese bar stock can be used to build up the corners and the lips to their original strength. This is especially true if the bucket was originally equipped with a manganese-steel lip.

The same remarks apply to the teeth of dragline buckets. Therefore, the good field superintendent insists upon frequent hard-surfacing and repointing of the teeth, thus securing longer life to these vital digging parts of his buckets. On the other hand, if attempts are made to weld manganese steel repointers to heat-treated carbon-steel-base teeth,

(*Concluded on page 60*)

RUD-o-MATIC TAGLINE



A FOOL-PROOF TAGLINE

The Rud-o-Matic Tagline is operated on a spring principle and maintains at all times a positive tension sufficient to steady a clam shell bucket under any and all conditions, and will operate perfectly with the boom at any angle. It eliminates all the grief usually encountered with the average tagline as there are no weights, tracks, pins, carriages, or sheaves to wear out or to get out of order. Because of the large bearing and fewer sheaves, the saving on cable alone would eventually pay for it.

Tagline is complete with fair lead and cable attached and can be installed in less than one-half hour. Most of the crane manufacturers have adopted the Rud-o-Matic as standard equipment.

Manufactured by
McCaffrey-Ruddock Tagline Corp.
2121 E. 25th St., Los Angeles

How much does a good pot-hole cost?

TINKERED and humored into lasting far beyond its time, this venerable cargo jalopy may not look important, but it is! It carries food enough for several hundred fighting men and workers — fo... that may be delayed or lost by the wayside beca... of a pot-hole in the road.

How much does a good pot-hole cost? "... brother, plenty!" say men who know. Fo... of trucks daily ply our highwa... from farm to market and fa... plant, over th...

...asingly Tarvia and a righ... ance...

THE above is taken from a Barrett Tarvia advertisement in The Saturday Evening Post—a message telling American people of the vital war-time importance of road maintenance and repair.

Today millions of trucks ply our highways and back roads, from farm to market, and from mine and mill and plant. And many more millions of automobiles carry industrial workers to and from their jobs.

Roads that need repair can take an increasingly serious toll from this vital traffic. There's no calculating what they cost in excessive wear to tires and damage to cars, in accidents, delays and lost man-hours. Neglected pot-holes grow steadily bigger, steadily more dangerous and increasingly difficult to repair.

That is why it is so vitally important to concentrate upon *maintenance* in 1943. Highway engineers and officials are having to make limited appropriations and supplies work overtime. Why not discuss your problems with the Tarvia field man? He can help you make a little do the work of a lot. Remember; there's a right type of Tarvia and a right Tarvia method for the maintenance and repair of almost every type of road.

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK

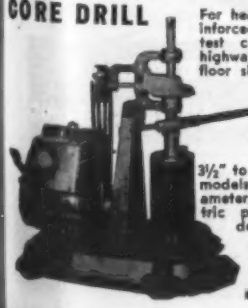
New York · Chicago · Birmingham · St. Louis · Detroit · Philadelphia · Boston · Providence
Rochester · Minneapolis · Cleveland · Columbus · Toledo · Youngstown
Syracuse · Buffalo · Cincinnati · Bethlehem · Portland, Me. · Bangor, Me.
Norwood, N. Y. · Cromwell, Conn. · Norwich, Conn. · Savannah, Ga. · Norfolk, Va.
In Canada: THE BARRETT CO., LTD. · Montreal · Toronto · Winnipeg · Vancouver.

Barrett Tarvia*

*Trade-mark Reg. U. S. Pat. Off.

NEW H-S PORTABLE ABRASIVE CORE DRILL

For heavy drilling of reinforced concrete—taking test cores in concrete highway construction and floor slabs. Drills holes



3½" to 6½" dia. Smaller models down to ½" diameter. Gasoline or electric power. Write for descriptive circular.

HOWE-SIMPSON, Inc.
50 E. Broad St.
COLUMBUS, OHIO

Courtesy, RCA Mfg. Co.

Access Roads Built To Get Raw Material

In order to make available the products of mines, quarries and forests for America's war industries, more than 2,850 miles of access roads have been scheduled for construction. By March 1, 1943, the cost of roads approved for construction, according to Commissioner Thomas H. MacDonald of the Public Roads Administration, had reached $9,000,000, and at the end of 1942, 100 miles of these roads had been completed at a cost of $346,000. These access roads to sources of raw materials are exclusive of the access roads to military establishments and industrial plants.

Most of the roads to mines, quarries and forests are shaped by a bulldozer and surfaced with gravel at relatively small expense. Deposits of 28 different minerals, metals and rare elements are tapped by these roads at about 225 locations in 22 states and Alaska. The access road in Alaska, 9½ miles long and costing $93,500, leads to a chrome mine.

State highway departments are in charge of the actual construction of about 30 of the projects, U. S. Forest Service about 90, U. S. Office of Indian Affairs 6, U. S. Grazing Service 55, and the Public Roads Administration about 15. The individual projects range in length from less than 1 mile to as much as 170 miles.

By states, the mileage and the construction costs of the access roads to sources of raw materials are as follows: Alabama, 6 miles, $130,000; Arizona, 144 miles, $255,600; Arkansas, 7 miles, $224,500; California, 550 miles, $1,446,895; Colorado, 399 miles, $882,239; Idaho, 371 miles, $1,426,830; Kentucky, 3 miles, $22,000; Maine, 5 miles, $16,700; Minnesota, 164 miles, $39,300; Montana, 187 miles, $980,475; Nevada, 260 miles, $1,095,164; New Mexico, 134 miles, $550,060; New York, 1 mile, $39,300; North Carolina, 11 miles, $29,000; Oregon, 223 miles, $790,275; Tennessee, 22 miles, $67,500; Texas, 15 miles, $55,000; Utah, 493 miles, $563,050; Vermont, 12 miles, $94,699; Washington, 88 miles, $547,059; West Virginia, 8 miles, $17,500; Wyoming, 27 miles, $43,927.

Catalog Describes New Structural Steel Shapes

The latest Stran-Steel catalog, recently issued by the Stran-Steel Division, Great Lakes Steel Corp., 1130 Penobscot Bldg., Detroit, Mich., features two new Stran-Steel developments. One of these is the new Stran-Steel structural shape made entirely from strip steel cold-formed to shape. Since strip steel can be rolled in an almost infinite series of thicknesses to produce members that more closely fit design requirements, a greater latitude in the choice of members is available. Structures framed completely in the new Stran-Steel C-sections have been designed for clear spans up to 130 feet.

While Stran-Steel is at present subject to the usual WPB priority schedules applicable to all steel production, the manufacturer points out that these new developments provide economies for such construction as is required at present and will also be of interest to those who are planning for post-war construction.

Copies of this new Stran-Steel catalog may be secured by interested contractors and engineers direct from Stran-Steel by referring to this review.

SEWER PIPE JOINTING COMPOUNDS
manufactured by **SERVICISED**

HOT-POURED COMPOUND
Servicised Hot-Poured Compound is an inexpensive, quick setting asphaltic preparation that produces tough, flexible joint connections. Over 1,500,000 pounds were used by contractors throughout the country during 1942. This hot poured compound is shipped in Fiber Containers that open very easily.

TUFFLEX
Tufflex is a cold trowelling plastic that is premixed; and arrives on the job for immediate use. Outstanding for special jobs in wet trenches. This excellent material will set under water, assuring effective sewer pipe connections as well as continuous jointing of sewer pipe that results in great saving of time.

Send for Descriptive Folder

Pioneers in the Construction Material Field for over twenty-three years.

SERVICISED PRODUCTS CORPORATION
6051 West 65th St. Chicago, Ill.

USE TARPAULINS
Order Now!
QUICK SERVICE
NO PRIORITIES NEEDED

Speed construction. Protect vital materials in all sorts of weather. FULTON TARPAULINS will give you maximum satisfaction. Contractors Supply Dealers in every state sell the FULTON line. Specify SHUREDRY and FULTEX. FULTON products are good and prices are right. If your dealer can't supply you, write our nearest plant for catalog, samples and prices.

Fulton Bag & Cotton Mills
ATLANTA ST. LOUIS DALLAS
MINNEAPOLIS NEW YORK NEW ORLEANS KANSAS CITY, KAN

SEAMAN *Performance* DATA:

WE SAW STABILIZATION COSTS CUT IN HALF THIS YEAR!

Compacting Part of Area While Mixing Operation Continues in Soil-Cement Stabilization.

RALPH W. REID *(left)*
GLENN P. HOLCOMB *(right)*

Here's a letter from Reid-Holcomb Company, Construction Equipment Distributors of Indianapolis, Indiana:

"... we have been greatly interested in the exceptional performance of the SEAMAN PULVI-MIXERS which are operating on a large soil-cement job in this State.

Our observation has been that the work has been done not only at a great saving in time, but that a better and more thorough mixture of soil and cement has been obtained. The excellent control of moisture in the process due to the SEAMAN PULVI-MIXER has been an outstanding factor.

We would say that the SEAMAN PULVI-MIXER has cut operating costs 50% as compared with the cost of other equipment that has been used for such work in the past ..."

Cut costs 50% — and did a faster, better and more thorough job! That's why highway engineers, contractors and the armed forces pick the SEAMAN MIXER wherever there's a job of soil-stabilization to be done.

The SEAMAN PULVI MIXER

SEND FOR THIS BOOK
FREE! A Report of SOIL STABILIZATION METHODS

SEAMAN MOTORS
MILWAUKEE WISCONSIN

Hints For Solving Guard Rail Problems Caused by the War

At the meeting of the Highway Research Board in St. Louis, the Committee on Highway Guard reported some of the problems which have been discussed carefully prior to the completion and circulation of its report "Wartime Road Problems—No. 2, Design of Highway Guards." With speed reduction to 35 miles per hour, although it was 40 miles when the original report was written, the problem principally resolved itself into the protection of the motorist during the winter months, when snow and ice conditions exist.

The Committee gave consideration first to the complete elimination of the guard through widening the shoulders and flattening the slopes. The AASHO has made the following statement with regard to construction of this type: "It (highway guard) may be omitted where it is practicable to provide slopes of 1 on 4 or flatter because a driver, forced on to such a slope, has a chance of regaining control of the vehicle".

The second consideration was the placement of wood posts centered in such a manner that they will be ready to take the type of rail desired when the rail again becomes available. If it is impossible to streamline the shoulders and slopes, a possible solution may be found in placing the posts in this manner. In more hazardous locations it might be desirable to augment these post installations by placing additional posts in line.

Consideration was given to a design containing a minimum of critical material. Oregon uses a design consisting of wood posts with laminated timber rail supported by steel cantilever-spring brackets. However, with restrictions on both steel and construction lumber, the possibilities of constructing this type are lessened.

The various steps or designs which can be considered and which might lead later to the construction of a modern guard include earth mound guards, boulder guards, stone masonry guards, timber guards and rustic guards.

Barriers made of continuous mounds of earth have been used as highway guards for a good many years in a number of localities. The construction suggested is to place earth along the shoulders of the road to a height of approximately 2 feet, permitting it to take a natural slope of 1 on 1½ or steeper. This forms an effective barrier in that a vehicle is slowed up as soon as the outer wheels attempt to climb the guard and contact the soft earth, and has the advantage that earth is available when other materials are not and, at the same time, is economical.

Guards made of boulders can be used along roads in mountainous country, especially where boulder flows or heavy rock cuts make a supply of large stones available. The guard is formed by placing the heavy rock or boulders at regular intervals on firm ground along the shoulders, the spacing between boulders being dependent on their size. This guard, while not resilient, is sturdy, fits in with the construction and imparts a sense of safety. Also, it is economical to construct.

Stone masonry guards are another type which fit in where stone is available. It is more pretentious than the boulder guard and, consequently, more expensive. Guards of this type can be built of either dry or mortar stone masonry, and the design can be varied to suit conditions. Again, they are not resilient but they form effective barriers.

Timber in some form or other has been used in highway guards over a considerable period of time. It is easily worked, lends itself readily to design, and is relatively inexpensive where local materials are available. The rail in timber guards should be kept low, approximately 2 feet in height, and should be a tough, non-brittle species of wood, with the rail kept as far as possible from the inside face of the posts. They were used when road speeds were low and should fit into the picture for the duration of the low-speed era in which we find ourselves, if and where the necessary timber is available. If construction timber is not available, the rustic guard might be considered.

Rustic guards are suggested from the utilitarian rather than the aesthetic standpoint. At the present time it appears as if it might be the only available design, if timber must be considered for this construction, as standing timber where available, after felling and trimming of the outer and inner bark, can be used for posts, while logs obtained in this manner can be used to form the log rail. This rail should be kept low, while posts or boulders may be used for support.

The report mentioned in the opening paragraph is augmented by sketches and photographs of the several designs and concludes with a short table giving a rough estimate of the life expectancy of posts when set in the ground, referring to the wood species most likely to be used in highway-guard construction. Careful study of the full report is recommended if any considerable program of guard-rail construction is under consideration at this time.

"Lengthening Equipment Life," an article which will appear in the May issue of CONTRACTORS AND ENGINEERS MONTHLY, *tells the story of careful planning of equipment inspection and overhaul by Franklin County, Ohio.*

VIBER COMPANY CONCRETE

VIBRATION

MOST PROFITABLE FOR

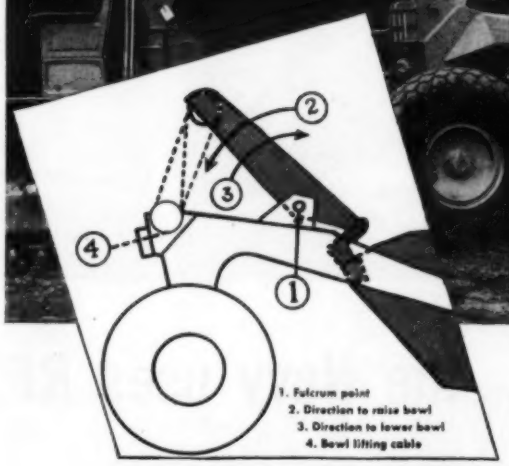
REINFORCED CONCRETE BUILDING CONSTRUCTION

When the job calls for mass vibration—the Viber Vibrator at work above is your best bet. Especially made for walls over 10 inches thick, foundations, large girders, thick floor slabs, columns . . . large reinforced concrete bridges, grade separations, concrete floor systems, concrete arches and rigid frame structures . . . In a word, for all concrete with large aggregate and low water-cement ratio.

Write for complete VIBER data TODAY!

VIBER COMPANY
726 So. Flower
BURBANK, CALIF.

Here's Why HEIL CABLE SCRAPERS Are FAST-LOADING ... Even in Loose Soils Like Sand



JACK ARM ASSEMBLY
GIVES FAST RAISING AND LOWERING OF BOWL

. . . with short cable length and low line pull. The jack-arm assembly uses the mechanical advantage gained by leverage to achieve this fast lifting action. The line pull is low because the lifting is done by leverage instead of directly through the cable.

"Look at that pumping action!" experienced scraper operators say, when they see the Heil Twin Cable Scoop operate for the first time. They refer to the rapid raising and lowering of the cutting bit made possible by the fulcrum-type lift — helping to force loose soils into the bowl, and saving many valuable minutes out of every operating hour . . . In improving scraper performance, Heil engineers developed fundamental design changes . . . such as scientifically located draft pivot point, tilting floor push-out, contoured bowl design, all-welded sections, etc. These improvements add up to bigger yardage at lower cost, so that you can earn a reputation for on-time performance . . . Investigate these features now and be prepared for post-war equipment purchases. Write for bulletins. R-6

THE HEIL CO.
GENERAL OFFICES • MILWAUKEE, WISCONSIN

The HEIL Company is engaged in all-out war production for Victory

Roadside Advertising Controlled in Florida; Drive Brings in Scrap

The administration and enforcement of Florida's outdoor advertising law has not only provided a considerable improvement in the appearance of Florida roadsides, but during the scrap metal drive between 15 and 20 tons of metal signs and structures maintained in violation of the law were salvaged for the war effort by employees of the Florida State Road Department. William L. Hill, Director of the Road Department's Division of Outdoor Advertising, reports that owners of signs and structures cooperated 100 per cent when informed that the metal would go into the scrap drive.

Florida's law states that no advertisement, advertising sign or advertising structure shall be constructed, erected, used, operated or maintained within 15 feet of the outside boundary of a public highway or within 100 feet of any church, school, cemetery, public park, public reservation, public playground, state or national forest, highway or railroad intersections outside the limits of any incorporated city or town. No such signs may involve motion or rotation of any part of the structure or display intermittent lights, nor may they use the word "Stop" or "Danger", or present or imply the need or requirement of stopping or the existence of danger. They may not be a copy or imitation of official signs, nor may they be placed on the inside of a curve or in any manner that may prevent persons using the highway from obtaining an unobstructed view of approaching vehicles.

After giving wide publicity to provisions of the law and conferring with hundreds of advertisers affected by them, representatives of the Division of Outdoor Advertising began their campaign of removing paper and cardboard signs from buildings, trees and fence posts within sight of the highways and then, after personal contact with the large advertisers, the illegitimate board and metal signs and structures were removed. To date, more than 115,000 paper, cardboard, board and metal signs and structures found to be in violation of the law have been taken down, and there are still more to be removed.

Mr. Hill reports that fully 95 per cent of all the citizens of the state of Florida approve the law and also the reasonable manner in which it has been administered and enforced.

Airport Facilities Extended in Bolivia

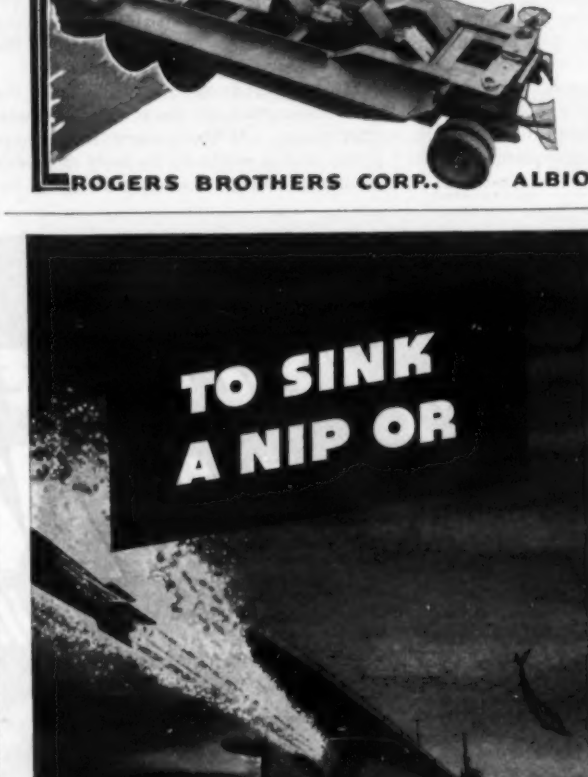
Air transport is undergoing a new spurt of development in Bolivia to serve wartime needs for improved communications between the high Andean region and the rubber and food-producing areas of the north and east. In Bolivia, the development of transportation has leaped directly from the llama to the airplane. The location of Bolivia's industrial centers on the lofty plateau makes this landlocked country particularly adapted to air transport.

Today Bolivia's mines are busy turning out tin, tungsten and other minerals for the United Nations. In addition, Bolivia's northeastern lowlands area has a stake in the vast Amazon basin rubber development. Air transport is playing a key role in integrating these wartime tasks, even to bringing food from the lowlands to the busy mining centers of the plateau. Extensive improvements to Bolivia's air transport facilities are being made to keep pace with the ever-growing demand for plane service.

Reports from La Paz, the Bolivian capital, reveal that work under way includes the construction and expansion of airports, runways and other air transport facilities. With the completion of these improvements, Bolivia's plateau centers of La Paz, Oruro, Santa Cruz and Cochabamba will be connected by a network of air lines with the food-producing lowlands and the great rubber-producing areas of the Amazon basin.

Construction has begun on a modernized airport at Cochabamba. This airport, designed to be one of the most complete on the South American continent, will cost some $750,000 and will have long modern runways, subterranean fuel storage, radio and meteorological facilities, modern night lighting, and accommodations for air travelers. According to *El Diario*, La Paz newspaper, emphasis is being placed on complete airport facilities in this region where the high terrain increases risks in aviation. This airport at Cochabamba is being built by Panagra.

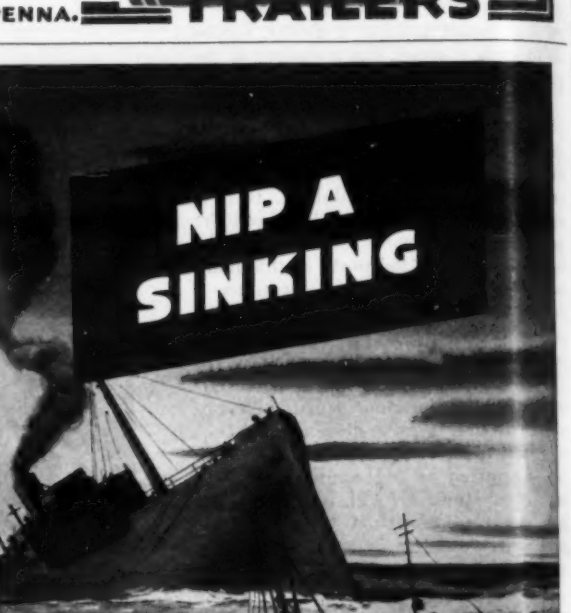
A number of other airports in Bolivia are being planned by Panagra, and fields are being improved at La Paz, Oruro, Uyuni and Santa Cruz.



Tanks move doggedly forward wreaking havoc on the enemy but their speed is necessarily slower than trucks and their span of continuous service considerably more limited.

So they crawl up on Rogers Trailers and are moved quickly to the line of combat—or from it when repairs or reconditioning becomes necessary.

Thus, the effectiveness of an important combat unit is increased manifoldly by these non-combat vehicles.



ROGERS BROTHERS CORP., ALBION, PENNA.

. . . the Navy uses RPM DELO!

The men who fight in U. S. Navy submarines believe that Japan is entitled to half the Pacific—the bottom half! That's where they're sending thousands of tons of enemy shipping.

But this isn't a one-way war. Many of our ships have been damaged, too — and would have sunk except for rescue by one of the Navy's ocean-going tugs. These sturdy ships are vital units of the Fleet, constantly on the alert to hold down our losses by towing crippled ships to bases where they may be repaired to fight again.

Submarines and tugs of the Navy both use RPM DELO to lubricate their powerful Diesel engines. So do other types of Navy craft. Day in and day out, RPM DELO in Navy Diesels is meeting and beating some of the toughest lubricating problems in history.

In *your* Diesels, too, RPM DELO will give dependable protection, freedom from ring-sticking and sludge trouble. No other oil combines its anti-oxidant, cleaning and non-corrosive properties. Switch now to RPM DELO.

STANDARD OIL COMPANY OF CALIFORNIA

RPM DELO
MARINE ENGINE LUBRICATING OIL

ORDER RPM DELO FOR YOUR DIESELS

RPM DELO is marketed under the following names:
RPM DELO • Caltex RPM DELO • Kyso RPM DELO
Signal RPM DELO • Imperial RPM DELO • Sohio RPM DELO
CONCENTRATE
Ask your Diesel engine manufacturer or distributor for the RPM DELO supplier in your vicinity

California's Methods Of Controlling Debris

(*Continued from page 39*)

embankments, a common drainage practice requires the location of a culvert in the bottom of a waterway which places the culvert entrance in the lowest part of a debris basin susceptible to rapid filling with flowing detritus. At such locations it is essential that the muck be kept from entering and clogging the culvert entrance. Perforations or openings in the riser should be large enough to permit entry of water and small enough to exclude entry of rock. The barrel or chimney should be carried well above any anticipated deposit and increased in height as necessary.

Natural Detritus Basins

In certain mountainous areas of easily eroded materials, particularly disintegrated granitic materials and silts, with steep slopes and heavy run-off, it has been found to be economically impractical to provide a culvert large enough to carry safely the surges of flowing detritus. The perforated debris riser is an expedient solution as it prevents clogging of the culvert entrance at a critical period when the debris basin is filling with a surging heterogeneous mass of muck, rock and debris from surface accumulations. The basin simply acts as a reservoir to store the flowing detritus until it can be dewatered by the perforated debris riser and later removed under periodic maintenance operations.

Under certain conditions, the debris riser may be progressively built up and an extensive debris table formed, which will be self-sustaining to a greater extent year by year, finally depositing its load at a safe distance above the culvert entrance.

Open Spillways

The most serious losses of embankment in California were found to have occurred in mountainous areas where debris basins proved inadequate, resulting in water overflowing the roadway embankment, causing complete washouts. The investment in heavy embankments across ravines encountered in rough terrain definitely warrants not only ample principal drainage, but the development of auxiliary drainage facilities as a factor of safety.

The debris spillway, as an adjunct to the debris basin, is considered by the committee to be one of the foremost improvements in California drainage practice developed subsequent to the 1938-40 storms.

Combination Debris Basin

A storm of 100-year frequency occurs every year at scattered places in California, and when it does occur, the damage is usually serious. The expense of providing against heavy damage from even the 100-year frequency storm has been found to be relatively small. The combination debris basin, that is, the spillway plan of drainage, consists of a debris basin provided with a culvert and riser for normal drainage, supplemented by auxiliary drainage facilities wherein flowage onto the roadbed from an overtaxed debris basin is confined inside the shoulder dikes and flows down the channelized roadbed until a safe and natural place is found to spill the water from the roadway.

California Division of Highways Photo

Typical debris-basin spillways, showing a lined spillway in the background and an unlined spillway in the foreground—one of several debris-control methods used in California.

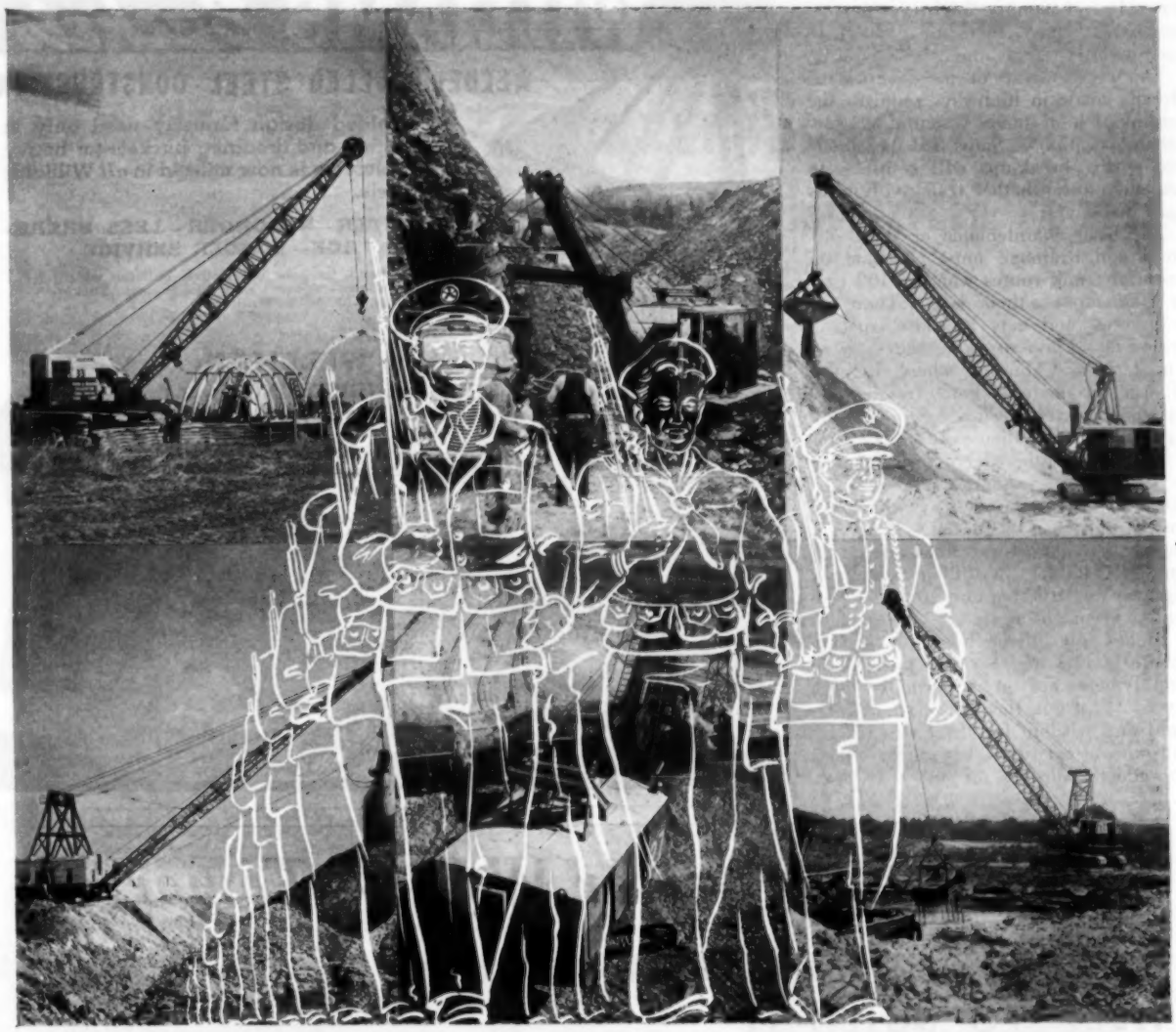
Personnel

The Committee of the California Division of Highways which prepared the joint departmental review of culvert practice was composed of R. Robinson Rowe, Assistant Engineer, Bridge Department, Robert L. Thomas, Assistant Engineer, Surveys and Plans, George A. Tilton, Jr., Assistant Construction Engineer, and Clarence F. Woodin, Assistant Maintenance Engineer.

New Paint Standards

The latest edition of the special compilation of A.S.T.M. Standards on Paint, Varnish, Lacquer and Related Products presents in their latest form more than 120 specifications, tests and definitions issued by the American Society for Testing Materials through the work of its Committee D-1. A number of the standards are given for the first time, and another group of four new tests covers evaluation of checking, cracking, chalking and erosion of exterior paints.

Copies of the 425-page publication in a heavy paper cover may be secured from the American Society for Testing Materials, 260 So. Broad St., Philadelphia, Penna., at the following prices: 1 to 9 copies, $2.25 a copy; 10 to 49 copies, $1.75 each.



SOLVING THE MAN POWER PROBLEM ON THE MATERIAL HANDLING FRONT . . . . .

MARIONS' responsibilities are four-fold today. They must clear the way for war plants, army depots, airports, war housing projects, camps and the like. They must dig and handle vital raw materials to keep our vast war machine rolling to victory. They must build ships, load and unload cargoes. They must release men from the material handling front to ease the man power shortage elsewhere. That these jobs are being done well is confirmed by MARION records of performance. Twenty-four hour schedules pay tribute to half-a-century of sound engineering.

THE MARION STEAM SHOVEL COMPANY, Marion, Ohio, U. S. A.

MARION

SHOVELS • DRAGLINES • CLAMSHELLS

CRANES • PORTAL CRANES • WALKERS

WORKING FOR VICTORY: DIGGING — Coal • Magnesium Iron Ore • Copper Ore • Bauxite • Manganese • Nickel Molybdenum • Sand & Gravel • Clay

MATERIAL HANDLING — Shipbuilding and Cargo Loading

BUILDING — Airports, Ordnance Plants, Arsenals, Army Camps, Marine Bases, etc.

UNIVERSAL

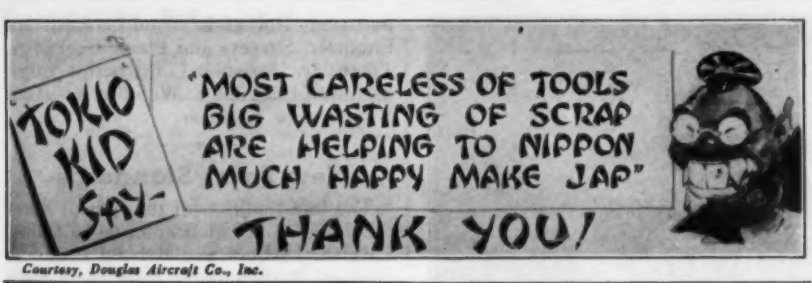
ARC WELDING ELECTRODES

Steel, Bronze, Hard-facing

Prompt Delivery

UNIVERSAL POWER CORP.

4297 Euclid Ave., Cleveland, Ohio



Courtesy, Douglas Aircraft Co., Inc.

Maintenance Not Cut By Less Highway Use

There seems to exist a widespread idea among motorists that a proportionate reduction in maintenance cost will follow the reduction in traffic volume due to gasoline rationing. The fallacy of any such contention is obvious to highway engineers. However, we are recording some facts presented by M. J. Hoffmann, Commissioner, Minnesota State Highway Department, before the annual convention of the American Association of State Highway Officials, in order that state highway engineers in general and county highway departments may have them to present to budget-cutting legislators.

The preservation of the investments already made in highways requires the continuation of many essential maintenance operations. Snow and ice, floods and spring break-ups will continue to take their toll whether traffic volume is light or heavy.

The basic maintenance of road surfaces and drainage must continue on essential trunk routes whether 100 cars or 1,000 cars use them daily. There are at present, and may be more, specific routes in certain areas within each of our states and counties where, because of war production, both freight and passenger travel are heavier and pound the roads harder than ever before.

There is another factor which must be taken into consideration before any proposal to reduce motor-vehicle and gas-tax rates is considered. It is well known that a post-war financing problem is inevitable. It will confront every highway constructing unit from the Federal Government down.

Right now, throughout the nation generally, income, earning power and employment are at abnormally high levels. Is it not, then, the part of foresight and wisdom for the states to collect now, at existing rates which impose no added burden on the road-user group, some part of the funds we know will be required to meet the inescapable post-war highway financing problem? Or would it be better to evade the issue now, and later be obliged to mortgage our future by treasury-draining bond issues? It is believed that an enlightened public can be relied upon to furnish the correct answer.

New Wire Sales Manager

Announcement has been made by the Wickwire Spencer Steel Co., New York City, of the appointment of Wilfred C. Shattuck as Wire Sales Manager, with headquarters in the company's New York offices. Mr. Shattuck, who was associated with Wickwire Spencer from 1925 to 1940, rejoins the organization after two years with John A. Roebling's Sons Co.

Crane Rejoins Jack Mfr.

Charles A. Crane has rejoined Templeton, Kenly & Co., Chicago, Ill., manufacturer of lever, screw and hydraulic jacks, in the position of Assistant to the President. Mr. Crane's first job was with Templeton Kenly, and he participated in building the first Simplex lever jack back in 1899, when the company's plant was located in a small shop on East Ontario Street in Chicago.

Many years ago Mr. Crane left the company to enter the construction field in which work he has gained extensive engineering experience which will be of great value to jack users.

WILLIAMS *Buckets*

WELDED ROLLED STEEL CONSTRUCTION

• Welded design formerly used only in steel mill and dredging buckets for heavy duty service is now utilized in *all* Williams Buckets.

LIGHTER—STRONGER—LESS BREAKAGE—LONGER SERVICE

Send for free descriptive bulletin which shows clearly why your next bucket should be a Williams.

ALL TYPES OF CLAM-SHELL, DRAGLINE, and CUSTOM-BUILT BUCKETS. ⅜ TO 18½ YD. CAPACITIES

Built by
The WELLMAN ENGINEERING COMPANY
7012 Central Ave.
Cleveland, Ohio

There'll Be a Better World—Tomorrow

AND BUTLER BINS WILL HELP TO BUILD IT

Right now the prosecution of the war is the primary consideration of every American, and everything else must wait upon final victory. But when that victory is won, there will be much to rebuild in devastated areas, many construction programs deferred by the war to be resumed. Then, as now, Butler concrete plants, bulk cement plants, and batching bins will be found on nearly every project where time and efficiency are important.

There will be important developments, after the war, designed to make construction jobs easier and less costly; you may be sure that Butler will pioneer them. But meanwhile, if you have a war project, don't fail to contact your Butler engineer for advice and equipment.

BUTLER BIN COMPANY • WAUKESHA WISCONSIN

YOUR TUNNEL LINER Is a "Patriot" Too

(PHOTO BY U. S. ARMY SIGNAL CORPS)

Old, familiar friends have taken new shapes and gone to war. Now ARMCO Tunnel Liner Plates can be purchased only for the most vital war-time projects.

Where metal tunnel liner *must* be used, ARMCO Plates are doing their part and more. They save precious metal because gage for gage this heavy duty liner is stronger (section modulus) than any other plate. Less metal is required to do the work. When completed rings can be spaced to take advantage of partly self-supporting ground, fewer plates may actually be used. Work moves fast; for one man can handle and assemble the light sections with structural wrenches.

If you cannot get ARMCO Tunnel Liner Plates, remember the steel is going into tanks, guns and ships—helping to win battles. After the war these liner plates will be back to help you cut costs and speed tunnel work. Armco Drainage Products Association, 115 Curtis St., Middletown, O.

ARMCO

TUNNEL LINER PLATES

Grading and Bridges For Kansas Route 10

(*Continued from page 28*)

and for the Mill Creek Bridge were both awarded to the Rhoades Construction Co. of Newton, Kansas. The overpass was originally designed as a continuous steel-beam viaduct with pedestal-type piers, 328 feet long, with a 26-foot roadway. Before the revised design for the overpass was completed, materials became so critical and the contractor was unable to give a satisfactory unit price on revised items, so the design was not completed and the project postponed.

The remaining structures were under contract to List & Clark of Kansas City, Mo. Pretty Creek Bridge is a continuous reinforced-concrete slab structure 115 feet long with the following quantities:

Excavation	229 cubic yards
Concrete	274 cubic yards
Reinforcing steel	34,600 pounds
Creosoted piles	630 feet
Metal pile points	20 units

This structure was quite well along at the time of our inspection so that the methods of construction could be studied. The sand and gravel for the concrete were stockpiled at the site, mixed in the proper proportions as permitted by the State Highway Department. Four men with wheelbarrows and one extra shoveler loaded the wheelbarrows and each man weighed his load on a Fairbanks wheelbarrow scale. A cement man emptied two bags of cement into the skip of the Koehring Dandie mixer between wheelbarrow loads of aggregate. The mixer operator handled the raising of the skip and dumped the mixed batches into two Insley rubber-tired concrete buggies which were each pushed by one man with a helper on the upgrade from the mixer to the runway over the reinforcing of the slab being poured. The runway was composed of heavy 2 x 6-inch planks laid on short-legged horses that cleared the top of the reinforcing by about 6 inches. A Mall portable vibrator was used in placing all the concrete, aided by two puddlers. A carpenter kept the forms ahead of the pouring and aided in moving and nailing the runways as required. A single hand finisher was in charge of the 29-foot 8-inch screed which was pulled first as a strike-off and then again as a screed to give the proper crown to the roadway concrete. He also hand-finished the concrete curb and all exposed faces.

The next structure was Paw Paw Creek Bridge, a 169-foot continuous steel-beam bridge, on which work had not started. The quantities for this structure were:

Excavation	414 cubic yards
Concrete, all classes	230 cubic yards
Reinforcing steel	36,000 pounds
Structural steel	63,020 pounds
Bearing devices	2,993 pounds
Creosoted piles	585 feet
Metal pile points	20 units

Spring Creek Bridge, another continuous reinforced-concrete slab structure, 115 feet long, also had not been started. The quantities were:

Excavation	401 cubic yards
Concrete, all classes	231 cubic yards
Reinforcing steel	35,380 pounds
Creosoted piles	810 feet
Metal pile points	20 units

The Manhattan-Clay Center Branch overpass for the Rock Island was the remaining structure. This was completed except for the west open-type abutment for which the fill was being placed ready for the driving of the piles. The quantities on this continuous-slab span pedestal-type pier structure 192 feet 11 inches long were:

Excavation, unclassified structural	315 cubic yards
Concrete, all classes	427 cubic yards
Reinforcing steel	87,050 pounds
Creosoted piles	603 feet
Metal pile points	20 units

C. & E. M. Photo

The new reinforced-concrete overpass carrying the relocation of Kansas 10 over the Manhattan branch of the Rock Island Railroad.

Personnel

This orphan strategic-network project has been through many vicissitudes. It was in disfavor by some of the cities and towns in its early days of planning because they were by-passed, which added to the delay in getting the work under contract. Then with the entry of the United States into the war and the increased tempo of the work on various Army projects, the need for the highway became very apparent. Following this, however, the profuse use of steel for the reinforced-concrete and continuous steel-beam structures led to further delays inevitable in the deliveries of steel for projects not directly connected with the war effort. Since the project could not be continued west of Kansas Highway 99, it would cease to perform its full purpose in relieving traffic on U. S. 40 with a paved full-width highway, so it really has become a war orphan, well-conceived but born under the most adverse conditions.

The work was done under the direction of the Kansas State Highway Department, R. C. Keeling, State Highway Engineer, with I. C. Shafer as Resident Engineer.

Pre-war designs required 1 ton of steel per $1,000 expended on our highways. Today this has been reduced to 0.2 ton per $1,000.— Thos. H. MacDonald, Commissioner, Public Roads Administration.

Complete line of gasoline, pneumatic and electric driven concrete vibrators and grinders
Write for information and prices
ROETH VIBRATOR COMPANY
2787 Farragut Ave. Chicago, Ill.

ARE *OUT-of-DATE* FINEGRADING METHODS SLOWING DOWN YOUR HIGH-SPEED PAVERS?

SPEED-UP with a Buckeye R-B POWER FINEGRADER!

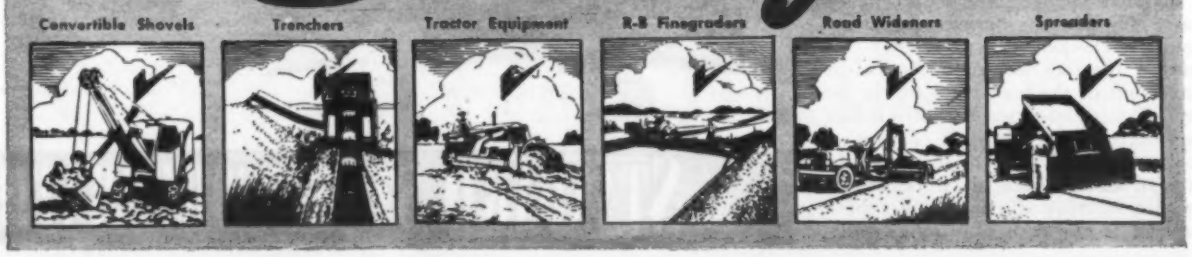
TODAY'S rush jobs call for speed from start to finish. Concrete and black-top pavers have been stepped up to record-breaking performances, yet on many jobs paving output is still keyed to out-of-date finegrading methods that waste time, paving material and money.

Power finegrading with job-tested Buckeyes delivers an accurate, smooth grade at rates to keep pace with your fastest paver. Slow hand operations are eliminated; there are no variations in grade to waste costly paving material . . . the job's done *right* and done *fast!*

No other existing equipment can prepare subgrade as quickly, cheaply and accurately as a BUCKEYE R-B POWER FINEGRADER

THE BUCKEYE TRACTION DITCHER CO.
FINDLAY • OHIO

Built by Buckeye



Caution in Handling Explosives Saves Lives

(*Continued from page* 43)

rock after loading has started, it is usually wiser to make no attempt to free it, because of the hazard of friction between rock and dynamite. If the hole is not completely blocked off it may be possible to continue loading by shucking the dynamite and pouring it down the space between the rock and the side of the bore hole. Otherwise it will be necessary to continue loading on top of the rock if there is sufficient room, or to stop loading this hole and depend upon the charge in the adjacent holes to pull the burden. Every precaution must be taken to make sure that the Primacord or electric blasting cap wires are still intact.

It occasionally happens that the hazard of dislodging a stuck cartridge of dynamite is so great that it should not be attempted. This case should be treated as just described.

If a thunderstorm threatens while holes are being loaded, connected, or fired, the operation should be stopped at once as there is danger that lightning may strike the explosive directly or may discharge electricity to detonator wires and thus set off one or more of the primed charges. Everyone should leave the shot as soon as possible. The time to ward off accident from a thunderstorm is when the first threat of storm is observed, as it should be realized that an approaching storm frequently creates as much electrical disturbance as one in progress.

Covering Charges

After loading, the holes should be completely filled with stemming material, preferably sand or clean crusher screenings. Ordinarily, it is not necessary to use a tamping block to settle the stemming in well-drill holes, as it will be sufficiently compacted by the action of shoveling it down the hole and by its own weight. Small-diameter poles may be used to prevent bridging of the stemming material in wagon-drill and small well-drill holes. Care must be observed both during the loading and tamping operations to avoid damaging either the Primacord or the cap wires. It is recommended that they be protected by a covering of box-lining paper or fibreboard at the collar of the hole.

Regardless of the method used for firing a blast, no attempt should be made to connect up until excess dynamite, boxes, tamping blocks, and so forth have been removed and all persons not needed for the actual operation of connecting sent off the shot. This will eliminate the possibility of a careless person tripping over and breaking some of the connections.

Before starting to hook up a shot primed with electric blasting caps, the foreman should make certain that the firing switch on the power line is locked in the "off" position, and that the lead lines are disconnected from the blasting machine or other source of power and are short-circuited. The work of making the connections should proceed in a logical and orderly manner so that it will not be necessary for the men to walk over the finished connections.

One easy way of assuring this condition is to begin hooking up at the end of the shot farthest removed from the source of power. Series connections should be checked with a properly constructed blasting galvanometer before connecting to the lead wires, or in the case of parallel-series circuits, before connecting to the bus wires. Before attaching the lead lines to the shot, the foreman should send all workmen off the shot, approve all connections, check the lead line with a blasting galvanometer, and make sure that it is short-circuited on the power end. Care should be taken to use an adequate length of lead wire to insure that the man firing the blast will be in a safe place.

Electric blasting caps should be fired by a blasting machine or by means of a positive double pole switch. Shooting with makeshift contacts or with dry cells should not be permitted.

Primacord shots may be detonated by either fuse and cap or electric blasting caps. If the shot is to be fired with an ordinary blasting cap, the cap should be securely fastened to the safety fuse with a cap crimper and seated on the freshly cut end of the Primacord with a union. The fuse should be long enough to allow the man who lights it plenty of time to reach a place of safety without running.

If an electric blasting cap is used to initiate the Primacord, it shall be securely fastened to the freshly cut end of the Primacord with a union. Before firing, flagmen or guards should be placed a safe distance away from the blast and at such locations that they can prevent anyone approaching the shot. A simple, standard and positive system of signals shall be agreed upon so that everyone around the quarry will be warned of the blast in ample time. Obviously the signal must not be given to close the switch or light the fuse until everyone has reach a place of safety. If possible, observers should stand to the windward of the shot with their backs to the sun and under no conditions should they rush back into the smoke from a shot. A few minutes' wait until the smoke dissipates will not have any effect on the results of the blast, and it will allow everyone to return to the scene in safety.

Army-Navy "E" Award Made to Caterpillar

The Caterpillar Tractor Co., Peoria, Ill., has been awarded the Army-Navy "E" for outstanding achievement in the production of war material. Presentation of the "E" flag was made at appropriate ceremonies at the plant on March 12, by Brigadier General D. McCoach, Jr., Assistant Chief of Engineers, and Captain E. A. Lofquist, Chief of Staff, Ninth Naval District.

In addition to the presentation of the flag to the company, an "E" pin was given to each employee, signifying his outstanding contribution to the war effort.

Heavy-Duty Trailers

The line of La Crosse heavy-duty trailers for the transportation of construction equipment and materials is described and illustrated in a sales engineering manual issued by the La Crosse Trailer & Equipment Co., La Crosse, Wis. This manual not only contains detailed specifications on the wide variety of La Crosse trailer models but also is profusely illustrated with photos, showing the types of transportation service to which these trailers are adapted.

Copies of this manual may be secured direct from the manufacturer.

FORM-TY ENGINEERING FACTS

Factors other than the Tie itself, govern the final cost of Ties in the wall.

COMPARISON DATA

SYSTEM	TIE	Safe Load	Tie Length	Weight per Unit: Tie Only	Weight per Unit: Working Parts	Weight per Unit: Total	Cost per Unit: Tie Only	Cost per Unit: Working Parts	Cost per Unit: Total
Prefabricated	½" Tyscrus	6000#	10"	.34#	2.94#*	3.28#	$.08	$ .31	$ .39
	A.C.Form-Tys	3000#	29¼"	.38#	1.73#‖	2.11#	$.05	$ .18	$ .23
	Snap-Tys	3000#	29¼"	.38#§	1.44#	1.82#	$.05	$ .14	$ .19
Field-Assembled	Band Iron	1500#	36"	.39#	.86#†	1.25#	$.03	$ .20	$ .23
	⅝" Rod & Clamps	5000#	36"	2.0#	3.62#†	5.62#	$.08	$ .60	$ .68
	⅝" Tilt Lock	5000#	10"	.32#	8.5#†	8.22#	$0.325	$1.45	$1.4825

§ Includes built in spreader unit.
‖ Includes Spreader Plates for Form Spreading.
† No provision for spreading forms.
* Includes Tycones for Form Spreading (Opt.)

Weight; the number of ties required; investment and depreciation on working parts; erecting and stripping time; labor required for "on the job" preparation; safety margins which must govern operating schedules—these determine the cost of your concrete form work. With Richmond's Form-Ty Engineering you get specific advantages in every one of the above-mentioned items. The comparison data shown above gives you an idea. For instance, why pay 68c when 38c is enough? Reach for your Architects or Engineering File and get the whole story in Richmond's Form-Ty Engineering Guide. Or, write us for your individual copy. Better still, let us look at your job plans and give you exact figures.

It May Pay You to Tear Out This Ad and Save It!

SEE OUR CATALOG IN SWEET'S

RICHMOND SCREW ANCHOR COMPANY, INC.
816 LIBERTY AVENUE · BROOKLYN, NEW YORK

Make YOUR subgrading operations pay a profit:

A STANDARD Subgrader prepares subgrade at 50% to 90% saving!

One operator and a helper can prepare subgrade with this machine at the lowest cost ever attained.

Not only does the efficiency of this machine cut down subgrading costs, but it will also lower your costs of rough grading, form setting, and concrete or asphalt placing.

(WRITE FOR BULLETIN NO. 603)

END VIEW

SIDE VIEW

And dollar losses due to voids and improper subgrade will be entirely eliminated.

This machine is building most of the airports in the West.

Detailed records to substantiate this claim are obtainable from contractors using these subgraders. *Write us for further information.*

STANDARD STEEL CORPORATION 5001 So. Boyle Los Angeles

OXYGEN is vital..
DON'T WASTE IT
Turn off torches when laying out work.
Do not use wasteful pressures or oversize tips.
Check hose and connections regularly for leaks.
Use all the gas in each cylinder before connecting a new one.
Close cylinder valves when not in use.
Keep tips clean.
Be sure equipment is in good working order.
Help your pals in the Armed Services
FIGHT WASTE

Road Work Restricted By New Order of WPB

To conserve man-power, materials and machinery, the War Production Board, on March 17, withdrew a blanket authorization which had permitted highway departments to begin road construction jobs, provided no critical materials acquired after May 6, 1942, were used. This authorization, which gave highway departments the right to build any roads where no priority assistance was required, was revoked so that equipment and materials tied up on some of these jobs might be diverted to the construction of important military and access roads.

Simultaneously, the WPB delegated to Regional Directors the authority to permit the start of highway construction jobs costing less than $100,000 where Federal funds are not required and where no priority assistance is needed. Regional Directors of WPB will exercise this authority after consultation with District Engineers of the Public Roads Administration. Since highway construction jobs costing more than $100,000 must go to the WPB for approval by the Facility Review Committee, these applications will be processed in Washington by the Governmental Division of WPB. Similarly roads requiring Federal funds must be certified for their essentiality, so such applications also will be processed in Washington.

This action delegating authority to the field is in line with the general decentralization policy of WPB. Authority to permit the start of residential, agricultural, and many types of commercial construction, costing less than $10,000, was placed in Regional offices on March 8. Regional Directors are also empowered to authorize the beginning of highway construction costing less than $10,000 where priority assistance is required.

Road construction jobs as defined by WPB orders include grading, drainage and surfacing of highways; erection of bridges and culverts; installation of safety and control devices; and the construction or installation of curbs, gutters, and sidewalks.

The blanket authorization to start road construction, which was revoked on March 17, was contained in Order L-41-600. The action empowering Regional Directors to authorize the beginning of highway construction is contained in an administrative order.

Electric Drilling Rigs

Electric drilling rigs to meet any drilling problem are described and illustrated with photos, charts and diagrams in a new 57-page booklet recently issued by Westinghouse Electric & Mfg. Co. This new booklet discusses the advantages of electric drilling, tells where to use d-c variable voltage rigs, and where to use a-c equipment. It points out that electric rigs are economical, can be used in practically any locality, meet varying local conditions, speed set-up, and are suitable for all types of drilling.

Typical equipment for various drilling depths are listed for both a-c and d-c drilling, and their maintenance and care are discussed.

A copy of booklet B-3038 may be secured from Dept. 7-N-20, Westinghouse Electric & Mfg. Co., East Pittsburgh, Penna., by mentioning this item.

Lubrication with Graphite

The use of "dag" colloidal graphite as a lubricant in engines, water pumps, and similar equipment and for belt drives, screw threads, bolts and nuts which must be removed readily is discussed in a new 12-page illustrated bulletin recently issued by the Acheson Colloids Corp., Port Huron, Mich. This bulletin summarizes the characteristics of colloidal graphites and cites a number of typical applications.

Copies of this bulletin No. 430-Y may be secured by those interested direct from the manufacturer by referring to this item.

Burns Carbon
Action is Immediate

CARBO-FLO
Saves Fuel
Restores Motor Efficiency

Carbon Remover

Why Let a Motor Knock Itself to Pieces Because of Carbon!!
Or Why Take It All Apart Just to Remove Carbon!!!

LET CARBO-FLO CARBON REMOVER CLEAN OUT ALL THE CARBON IN **5** MINUTES!!

CARBO-FLO CARBON REMOVER is a powder that burns the carbon off the valves, pistons and spark plugs. Simple to use—just remove the air cleaner and shake powder from convenient can into carburetor while motor is running.

THE ACTION IS IMMEDIATE. THE EFFICIENCY OF CARBO-FLO CARBON REMOVER WILL AMAZE YOU!!!

One can contains sufficient for any car, truck, or tractor motor. The price is $2.00 per can. Packed 6 or 12 to the carton.

CARBO-FLO CARBON REMOVER WILL SAVE MANY TIMES ITS COST IN GASOLINE, OIL—AND MOTOR EFFICIENCY.

CARBO-FLO MANUFACTURING COMPANY, 549 West Randolph St., Chicago

NO PRIORITIES ON WAR BONDS
Next to the Stars and Stripes, Cletrac is proud to be flying the Minute Man flag. Over 95 per cent of Cletrac employees are purchasing War Bonds by pay roll deduction.

Up hill and down vale—through valleys and over mountains, Cletrac power makes hundreds of thousands of swings daily against the Axis.

That's why Cletrac power is fighting power—patriotic power—which deserves every means you have of making it serve as long as possible.

Fortunately, Cletracs have always been *"Built to Endure"*—not only in use but even with abuse. However, like all machinery, Cletracs perform better with longer life if you inspect them frequently, lubricate them properly and maintain them carefully by replacing worn parts promptly.

In this conservation of equipment your Cletrac dealer is ready to give you substantial help. Keep your Cletracs swinging it by asking him for his advice and suggestions.

THE CLEVELAND TRACTOR COMPANY • CLEVELAND, OHIO

Cletrac Crawler Tractors
GASOLINE AND DIESEL

Many Opportunities In Post-War World

(*Continued from page 37*)

tinguished Service Cross for gallantry under fire in France in 1918, recently wrote: "Let us hope that the men of real vision and sympathetic understanding of the problems of men and of nations, both inside and outside the military service, will have enough influence to make their wishes felt in the program for permanent peace after the war. Remembering the let-down after the last war, I do not feel equal to predicting what will happen. After all, regardless of the huge size of our armed forces, when it comes to voting and occupying positions of importance, these men will be outnumbered by the rest of the population. The responsibility of making a better world will therefore be a joint one and not merely on the soldiers or the veterans. Let us hope that the members of the Church will not let the returned young men down."

This places the responsibility back on our leaders of thought in the Church—the ministers, the priests, and the rabbis. Spiritual post-war planning must start right now with the education of the people from the pulpit, through dynamic and thought-provoking guidance in the layman's responsibilities for the kind of a world the soldiers of democracy are fighting for.

Post-War Reconstruction

All of our plans must add up to adequate opportunities and better standards of living for all people. This includes the right of every individual to work and benefit from his labors, as well as the expansion of social security, old-age pensions, and unemployment insurance, with the major emphasis on proper planning *for* employment rather than for the lack of it. These aims can be realized by carefully considered planning now for the future welfare of this country and of the world. Plan for security in peace as you plan for victory in war. The delays and disasters caused by isolationism and our lack of preparedness have taught us a lesson; we must prepare for every contingency in the peace ahead.

It is the privilege as well as the advantage of the construction industry that it participates in practically every phase of human progress. Before a giant transport plane takes off, engineers and contractors designed and constructed the air field and paved its runways; before the wheels of industry can start to hum, hydro-electric or other plants have to be built to furnish the power; before our food can move from farm to market, a highway system had to be created; before ordinary citizens can join in Sunday morning worship, the church in which they meet had to be constructed; before we have any water in our homes, a dam was built, a water-works erected, and pipe lines laid.

Contractors and engineers, you have an even greater and more vital role to play in the post-war world than you have had in the development of this country and the speedy construction of facilities for the prosecution of the war. Plan *now* how you and your organizations can contribute most effectively to the reconstruction of a world at peace.

Post-War Highways

With the curtailment of highway work during the war, there will necessarily be a large amount of reconstruction absolutely essential at the end of the war, or as soon as the materials and manpower are available. In addition, plans are already being made for the extension and improvement of our highway system through the construction of super-highways bypassing cities and congested areas, and of similar routes to meet the problems of post-war traffic.

The place of highway construction in our post-war economy, its contribution to the employment problem, the plans now under way for such post-war projects, and the place of roadside development in our post-war highway planning will be discussed in our May issue, as the second in our series of articles on post-war planning.

Official Priorities For Travel Not New

The system of priorities now used on airlines to insure rapid travel facilities for government and military officials is not new, according to a recent report in *Highway Research Abstracts*. The report tells how in the British Isles 260 years ago passengers prepared their wills, bade farewell to friends and had prayers offered in the churches for their safety before beginning journeys on stage coaches.

The first regularly scheduled stage coach service was established on the 50-mile run between Edinburgh and Glasgow in 1678 under a franchise containing the following terms: "The said William Hume shall have in readiness one sufficient strong coach, to run betwixt Edinburgh and Glasgow, to be drawn by six able horses; to leave Edinburgh ilk (each) Monday morning, and return again—God willing—ilk Saturday night; the burgesses of Glasgow always to have a preference in the coach."

The construction of a floating airport is under way at the Amazon River city of Manaos, Brazil, an important center for rubber shipments, according to reports.

Equipped as a Concrete Surfacer

Placing a Stiff Mix Concrete

FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS

Operates 8 Tools

Concrete Vibrator, Concrete Surfacer, Form Sander, Wire Brush, Drill, Chain Saw, Circular Saw, Sump Pump

- Places low-water-cement-ratio concrete better, faster
- Eliminates honeycombs and voids
- Assures a stronger bond with reinforcement
- Permits an earlier stripping of forms
- Operates 2⅜" x 19" vibrator
- Variable speeds 1000 to 3000 r.p.m.
- Countershaft speeds 3000 to 7000 r.p.m.

Available on Priority Orders—write for literature and prices

MALL TOOL COMPANY

7743 SOUTH CHICAGO AVE. CHICAGO, ILLINOIS

Offices and Distributors in Principal Cities

for

NOVO Diaphragm Pumps

Give your pump the proper care for long efficient life

For all NOVO Model AD Diaphragm Pump owners, we have a new 50 page book on how to care for these pumps, how to get long life and the best service. Give size of your pump, 3" or 4".

These pumps and their power units, are practically taken apart right before your eyes. Any operator can understand the instructions for operation and maintenance regardless of his previous experience.

Disassembled (explosion) views are shown from which to order parts. Each assembly illustrated with parts disassembled, but in the proper order. Every nut, stud, and lock washer shown. You can't go wrong even if you don't know the name of the part—just give the reference number on the part and the plate and page number.

Send for your free copy. Give the size, 3" or 4".

NOVO ENGINE COMPANY LANSING, MICHIGAN

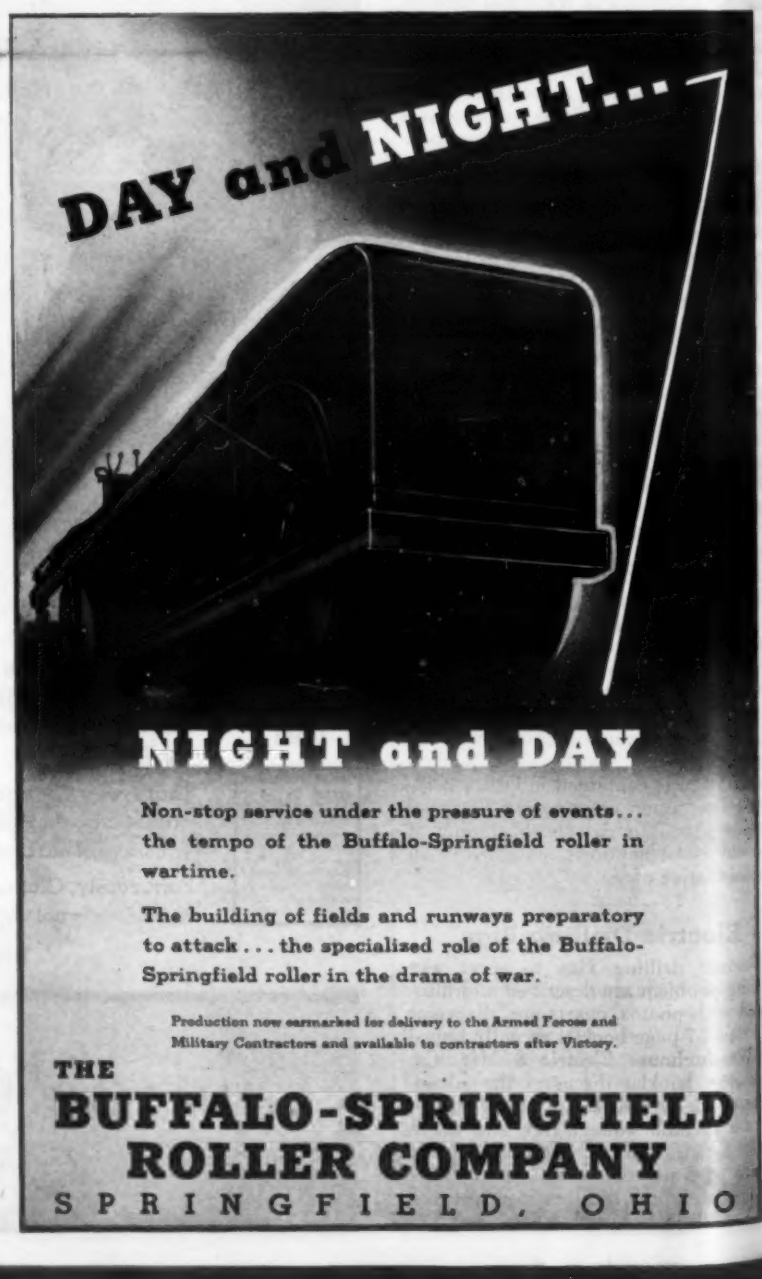
NOVO ENGINE COMPANY, 216 Porter Street, Lansing, Michigan

Please send me copy of your Operator's and Maintenance Manual. The size of my pump is { AD-3" / AD-4" }

Descriptive literature on Diaphragm pumps..... Self-Priming pumps..... Pressure pumps.....

NAME.....

ADDRESS.....



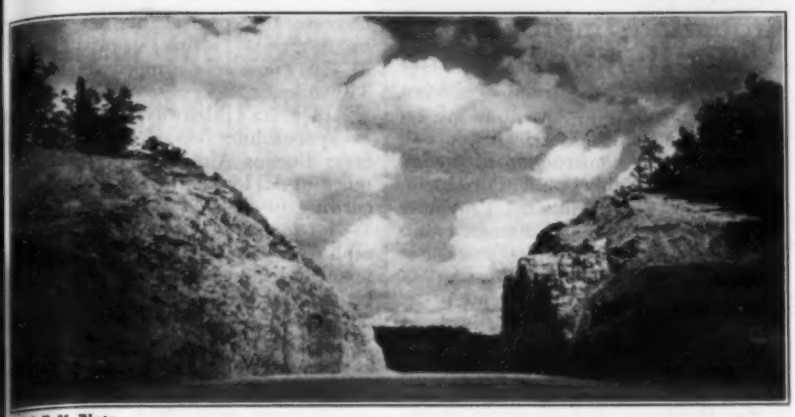
Non-stop service under the pressure of events... the tempo of the Buffalo-Springfield roller in wartime.

The building of fields and runways preparatory to attack... the specialized role of the Buffalo-Springfield roller in the drama of war.

Production now earmarked for delivery to the Armed Forces and Military Contractors and available to contractors after Victory.

THE BUFFALO-SPRINGFIELD ROLLER COMPANY

SPRINGFIELD, OHIO



C. & E. M. Photo
A 101-foot cut on U. S. 66 in Pulaski County, Missouri, from which 236,757 cubic yards of rock and earth were removed.

Huge Deep Rock Cut On U.S. 66 Cut-Off

The biggest rock cut on the highway system of the state of Missouri was completed by Fred Weber, Jr., contractor of St. Louis, Mo., in the summer of 1942. The state is improving the highway between Rolla and Waynesville in Pulaski County where the old alignment winds through the hills with poor sight distances and many curves. The project itself, which included this large rock cut, was only 1.038 miles long but involved 79,137 cubic yards of earth excavation and 198,622 cubic yards of rock to be removed. Of these quantites 57,823 cubic yards of earth and 178,934 cubic yards of rock came out of the one big cut at Hooker Hill.

The cut, in dolomite rock, is 1,150 feet long, 86 feet wide at the grade line, and 101 feet deep at the center line of the road. The rock was drilled on 3 to 5-foot centers with wagon drills, the holes being an average of 12 feet deep. The 60 per cent dynamite broke the rock satisfactorily for loading with power shovels with very little blockholing.

In removing the bottom of the cut, Missouri specifications require the rock to be excavated a minimum of 6 inches below profile grade and backfilled with coarse crushed stone of a maximum 3½-inch screen size, surfaced with fines, watered, and rolled by a 10-ton 3-wheel roller to firm compaction.

Post-War Road Work Urged by Officials

A proposed post-war highway program calling for the expenditure of not less than $1,000,000,000 a year of Federal funds for a period of at least three years was outlined recently to Major General Philip B. Fleming, Federal Works Administrator, by a delegation from the American Association of State Highway Officials who were presented to the Administrator by Public Roads Commissioner Thomas H. MacDonald.

Brady P. Gentry, Chairman of the Texas State Highway Commission and President of the Association, told General Fleming that an expenditure of $1,000,000,000 yearly in highway construction would provide work for a year to approximately 750,000 men, besides rehabilitating, improving and expanding the highway system.

"The success," Mr. Gentry said, "of such a proposed program in the three-year period immediately following the war must depend wholly on having sufficient and entirely complete plans ready when hostilities end . . . . It must be remembered that before contracts can be let for highway construction aggregating $1,000,000,000, the state highway departments must make surveys, secure rights-of-way, and draft detailed plans, at a total cost of approximately $200,000,000."

Besides Mr. Gentry, the delegation was composed of Gen. James A. Anderson, Commissioner of Highways for Virginia; C. W. Brown, Chief Engineer, Missouri State Highway Commission; T. H. Cutler, Kentucky State Highway Engineer; Frederic E. Everett, Commissioner of Highways for New Hampshire; J. W. Gentry, former Tennessee State Highway Engineer; Samuel C. Hadden, Chairman of the Indiana State Highway Commission; George H. Henderson, Rhode Island State Highway Engineer; H. A. MacDonald, Massachusetts Commissioner of Public Works; C. W. Phillips, Tennessee Commissioner of Highways; Fred R. White, Chief Engineer, Iowa State Highway Commission; and J. S. Williamson, Chief Highway Commissioner for South Carolina.

Black-Top Road Units

Four Littleford units for black-top road work are described and illustrated in a new folder recently issued by Littleford Bros., 485 E. Pearl St., Cincinnati, Ohio, from whom copies may be secured by interested contractors and state and county highway departments.

The units described include the Littleford Spray Master pressure distributor in sizes from 600 to 4,000 gallons; Littleford supply tanks in two models, ranging in size from 1,250 to 4,000 gallons; the Tankar heater in two models for providing steam for tank-car unloading and for thawing culverts, cleaning equipment, pile driving and similar uses; and the Littleford road broom, either power or traction-driven, for sweeping highways before applying bituminous surfaces.

PERIODIC LUBRICATION
PROPER ALIGNMENT
BIG FACTORS IN
IMPACT WRENCH
PERFORMANCE

4 Simple Maintenance steps keep Pneumatic Wrenches on the job

Because of their sturdy construction, slow motor speed and fewer parts (no springs or gears), CP Pneumatic Wrenches (impact type) give long service under severe conditions with a minimum of repairs. But, they will give even better service if they are given a little precautionary care.

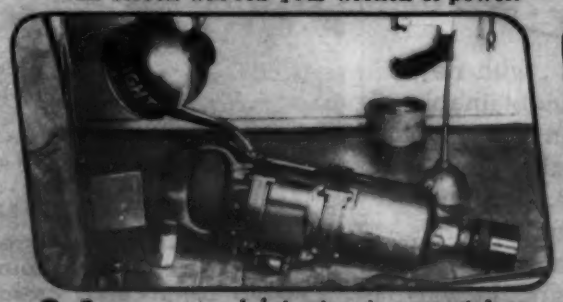
Here are four simple maintenance steps for your CP 365-R Pneumatic Wrenches. Do these things regularly and you will keep your wrenches on the job, cut repair time to the minimum and conserve strategic materials.

While these points apply particularly to the CP 365-R, they are applicable generally to other CP wrenches of the impact type. Detailed suggestions for the care of other models will appear in future advertisements.

HOW TO GET MAXIMUM SERVICE FROM YOUR CP 365-R PNEUMATIC WRENCH

1 Check the air screen at least once a week. Clean it with an air hose. A dusty, dirty air screen will rob your wrench of power.

2 At the beginning of every shift, check the through bolts and nuts on tool housing and motor housing. Be sure all nuts are tight.



3 Proper motor lubrication is essential to good wrench performance. Fill reservoir every day with a good grade of light oil.

4 Once each week, lubricate the 365-RP wrench with a grease gun. For the best results, use the CP Impact Wrench Grease.

★★★★★★★★★
PNEUMATIC TOOLS
ELECTRIC TOOLS
(Hicyclo...Universal)
ROCK DRILLS

CHICAGO PNEUMATIC TOOL COMPANY
General Offices: 8 East 44th Street, New York, N. Y.

★★★★★★★★★
AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

USE RIGHT BUCKET FOR THE JOB

Hayward makes all four — clamshell, dragline, electric motor, orange peel. A Hayward recommendation is unprejudiced.

HAYCO

THE HAYWARD CO., 32-36 Dey St., New York

Hayward Buckets

Placing Earth in Dam For Industrial Supply

(*Continued from page 2*)

cated in the trench excavation.

The dike sections are laid down with a 1 on 3¾ slope, both sides, and a rock toe 5 feet high on the downstream side. A 5-foot minimum thickness of rock riprap was dumped directly from trucks on the upstream side in the transition areas where the dam gradually changes from earth section to concrete section. Core sections, spread on a 4 to 1 slope on both sides, were also placed in the dike in the transition areas. The downstream sides of the dikes are topped off with 3 feet of selected pervious material and they have a maximum height of 35 feet.

Scraper and Truck Haul

The contractor used two hauling outfits, a pair of 12-yard Continental scoops pulled by Allis-Chalmers Model LO tractors, and a fleet of three 8-yard GMC diesel-powered trucks loaded by a 2½-yard Northwest shovel. Operating on the dike to spread the 6-inch layers of the pervious and impervious materials were an Allis-Chalmers Model LO tractor with a Baker bulldozer and an Allis-Chalmers Model AD power grader. The contractor found that the combination of the bulldozer and the power grader made for maximum efficiency, and either could perform the spreading operations to the degree required on the job. When the bulldozer was down for repairs, one of the Continental scrapers was used to break down the lumps in the clay material before the grader spread it.

The two outfits produced 2,000 cubic yards of pay dirt on the dikes per shift, the actual production being about equally divided between the scrapers and the shovel and truck outfit. The night shift, however, was credited with a slightly higher production than the day shift, due to the fact that dirt moving was the only operation carried on at night so that there was never a chance of some other operation borrowing a truck for an hour or two and cutting production. Further, there was more of a tendency to work the outfits to the limit at night instead of cutting out some unit that seemed to need overhauling. There was a great mortality among the trucks due entirely to green drivers. The shifts worked were: 6:30 a.m. to 2:30 p.m.; and 3:30 p.m. to 11:30 p.m., allowing time for greasing between shifts and at night.

The borrow pits ran along the downstream side of the dikes and varied from 200 to 500 feet wide, measured from the toe of the dike to the property line. On the left-bank borrow pit the haul road was on the outer edge of the pit, thus reducing the area available for borrow but there was an excess in that section. The average haul of the Continentals was 500 feet and where the haul went over this figure the trucks were used. The truck hauling was done under a subcontract with the owner being paid on a yardage basis. Material excavated in the concrete gravity section was also used in the embankments. This consisted of overburden, underlying sands and silts and weathered shales.

The Continental scrapers were originally equipped with crawler treads but the contractor found that repair parts were difficult to secure under war conditions so he shifted the scrapers to rubber tires with great success. The dikes were sprinkled continuously under the hot summer sun so that the moisture content would be proper for rapid compaction under the traffic of the hauling equipment. There were two tank trucks each equipped with two small metal tanks instead of the usual large tanks found on most earlier jobs—but try to buy a large tank today! One small tank was mounted crosswise of the truck bed forward and the slightly larger tank behind it longitudinally, with double piping to carry the water from both tanks to the sprinkler bar at the rear.

Lighting the Night Shift

During the day shift material was hauled to the areas where the portable and stationary lighting units were not available. Then at night the scrapers and trucks delivered the material to the lighted areas for maximum efficiency. The lighting outfits consisted of several Kohler 1,500-watt lighting plants mounted on skids and with a heavy wood tower supporting from two to four floodlights. There was also a string of floodlights on poles connected to the main power line at the sections of the dikes where the greatest volume of dirt was placed.

Concrete Section

The 664-foot concrete section is made

(*Concluded on next page*)

Argentina Improves Its Highway System

Several highway construction and improvement projects in Argentina are reported in a South American journal, among them the construction of a road between Tres Puntas and Portezuelo, on the route which links the Provinces of Cordoba, La Rioja, Catamarca and Tucuman. The cost of this work has been estimated at 328,006 pesos. (A peso is the equivalent of about 27 cents.)

Plans and estimated expenditures of 953,033 pesos also have been approved for the construction of three sections of the highway between Mazan and Poman in the Province of Catamarca which, when completed, will make this route an all-weather road. Repairs and improvements, at an official estimate of 180,867 pesos, are planned for the road leading to the thermal springs at Rosario de la Frontera. The subgrade will be covered by an asphalt paving 6 meters (about 20 feet) wide. These additions will increase the arterial highway system in Argentina which in 1942 totaled 21,456 kilometers (approximately 13,330 miles).

Argentina's highway link with Chile is approaching completion; the road from Buenos Aires to Mendoza, a distance of 1,114 kilometers, is paved, according to *Foreign Commerce Weekly*.

The four main arteries which represent Argentina's part of the Pan American Highway system are now open to traffic, and considerable work has been done toward improving and surfacing, it is stated. One section of the main highway to Bolivia is unfinished but the remainder has been improved and basic construction completed. The link to Paraguay is paved as far as San Justo, approximately 100 kilometers north of the city of Santa Fe. The artery connecting with Brazil has been practically completed. A bridge to cross the river Uruguay at Paso de los Libres to join the two countries is expected to be completed in 1945.

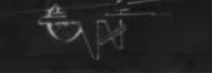
Wheel 'em HARD!
Wheel 'em OFTEN!
Sterlings can TAKE IT

In the present emergency . . . with new wheelbarrows practically unobtainable . . . Sterlings are proving again and again that they can take hard, everyday punishment and come back for more. Engineered and built for the tough jobs, Sterlings have supplied dependable material transport service for almost 40 years. In wartime or in peacetime production, you can rely on Sterlings to carry the loads.

STERLING WHEELBARROW CO., MILWAUKEE, WIS.

Look for this Mark of STERLING Quality

Sterling WHEELBARROWS

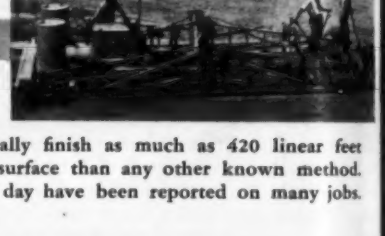


A 4026-½

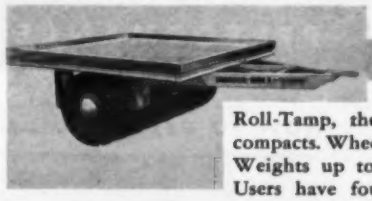
MADSEN EQUIPMENT for the Contractor

HERE ARE a few outstanding Madsen road construction tools that have proved themselves on many jobs throughout the country. They are available (subject to priority regulations) if you have a vital wartime job. If you have to wait, remember, Uncle Sam comes first.

JOHNSON FLOAT FINISHERS



Johnson Float Finishers have established speed records for finishing cement concrete highways; they will mechanically finish as much as 420 linear feet per hour and leave a smoother, finer surface than any other known method. Savings ranging from $50 to $150 per day have been reported on many jobs.

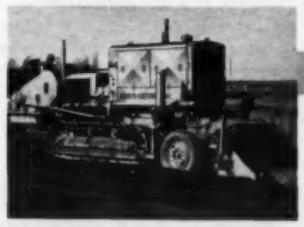


ROLL-TAMP COMPACTORS

Roll-Tamp, the newest type of compactor, kneads as it compacts. Wheels are free to independently raise and lower. Weights up to four tons can be loaded on the flat bed. Users have found it to be a handy on-the-job trailer.

MULTIPLE-BIN BATCHER EQUIPMENT

Bunkers, bins and batchers are built by Madsen for transit plants, sand and gravel plants as well as concrete and asphalt plants. Efficiency and long life are built into Madsen storage bin equipment. Conveyors, elevators, and weigh boxes with multiple-beam scales are also available.



ROAD PUG TRAVELING MIXERS

The Madsen Road Pug, manned by an operator and two swampers, picks up a windrow... mixes the aggregates on a continuous basis with road oil ...and discharges a well proportioned, uniform mix at a rate ranging from 250 to 550 tons per hour.

Complete ASPHALT PLANT EQUIPMENT

BUNKERS • CONVEYORS • ELEVATORS • VIBRATING SCREENS • COMBINATION SCREEN & DRYERS • DRYERS • DUST COLLECTORS • BINS • BATCHERS • MIXERS • BOILERS ASPHALT TANKS • GEARS • SPROCKETS • BUCKETS • CHAIN • BABBITT BEARINGS

MADSEN IRON WORKS, LTD.
5631 BICKETT ST., HUNTINGTON PARK CALIF.

ASPHALT PLANTS · ROAD PUGS · FINISHERS · DUST COLLECTORS
BATCHERS · ROLL-TAMPS · DRYERS · BOILERS · ASPHALT TANKS

Earth Dam Supplies Water for War Plants

(Continued from preceding page)

up of nineteen monoliths or separate blocks, and contains a 139-foot 6-inch section of controlled spillway, two 212-foot sections of uncontrolled spillway, and two sections each 50 feet 3 inches on either end through which the transition from earth dike to concrete dam is made by conically wrapping the transition section of the earth fill around the concrete. The controlled spillway has four Taintor gates, 17 feet in diameter, and also three 36-inch needle valves for low-water control. There are also two 5 x 7-foot sluices, located in the uncontrolled spillway section, which will be plugged for the present and later will be used for flood control.

The uncontrolled spillway consists of two 212-foot sections, one on each side of the controlled spillway section. A reinforced-concrete bridge over the entire spillway section will be used for operating purposes and carries a 16-foot roadway.

The concrete section of the dam is founded on a good gray sandstone at the deepest section and on brown sandstone at the ends. The maximum height of the concrete section from rock to the top of the roadway is 100 feet and to the top of the uncontrolled spillway section is 87 feet. A novelty in the construction of the concrete monoliths was the absence of a high-level deck for pouring the concrete. Instead all pouring was done by a Northwest crane with an 80-foot boom working from temporary earth ramps in front of each monolith. The difficulty of securing the steel for the high-level deck was the reason for its absence, although some consideration was given to the use of a wood trestle built from the profusion of timber cut at the site during clearing operations.

Quantities

The major quantities in the construction of the earth dikes and concrete spillway sections were:

Concrete, all grades	63,000 cubic yards
Common excavation	275,000 cubic yards
Rock excavation	40,000 cubic yards
Special excavation, rock	6,000 cubic yards

Personnel

The construction of this mile-long dam of earth with concrete control structure was done by contract at a cost of approximately $1,077,112 under the direction of the U. S. Engineer Department. The contractor was allowed 360 calendar days for completion from the date of the contract.

In the interest of national security, mention of the location of and personnel connected with U. S. Army construction is omitted.

KINNEY DISTRIBUTORS

—now at work on vital airport jobs in the U.S.A., Cuba, Haiti, Guatemala and Brazil—

can help you with any bituminous surfacing job—and do it quickly and efficiently—write

KINNEY MANUFACTURING CO.
3531 Washington St. Boston, Mass.

Less Gas Tax Income As Traffic Declines

Continued pressure to reduce motor-fuel usage in the East produced, in relation to volumes a year earlier, about the same reduction in traffic in January of this year as in December, according to Public Roads Administration reports. Traffic in the rest of the country, however, declined considerably less in January than in December.

On rural roads in the original eastern rationed area, traffic was down 50 per cent in January as compared with the same month in 1942, while the December decline was 48 per cent. Passenger-car traffic on 24 toll facilities from Maine to Florida was off 48 per cent in January.

In the area where rationing began December 1, a 36 per cent decline in rural traffic in January contrasts with 47 per cent in December. Passenger-car traffic on 56 highway facilities in the area was off 30 per cent in January. In the newly rationed area, the greater relative decline in traffic in December as compared with January may be explained, PRA officials believe, partly by the elimination of holiday traffic and partly by the apparent tendency of motorists to restrict driving more than is necessary when first subjected to rationing.

Several reasons are also suggested to explain the greater reduction in January travel in the eastern rationed area than in the newly rationed area of the country. One reason is the change in the value of B and C coupons from 4 to 3 gallons late in December and the continued devaluation of A coupons on the same basis. Another reason is the ban on pleasure driving, beginning January 7. This combination of restrictions served to eliminate much winter recreation and vacation travel which ordinarily represents a larger proportion of total travel in the East than in the West and Midwest at this time of year.

Motor-fuel tax collections in 29 states in January were down approximately 36 per cent, compared with a year earlier. The reduction in the original rationed area was 31 per cent, and in the area rationed since December 1, 38 per cent. These collections represent motor-fuel sales largely during the previous month of December.

There is, in America, the worst shortage of equipment of every sort that has ever faced us, and an even greater shortage of heavy scrap. You can help to relieve these shortages and add to the Nation's productive might by turning in every bit of scrap in your yard or shop.

4 WAYS to get more service from WIRE ROPE

Yes, wire rope is tough. It can stand up to the most rigorous service—and ask for more.

But that's no reason to abuse it. With a little care, by applying a few simple rules, you can get a tremendous amount of extra service from your rope.

1 Break it in with light loads

For example, when breaking in a new rope, don't slam on full power and speed right off the bat. Begin with fairly light loads. Operate at moderate speed. Give the strands of the rope a chance to seat down snugly and uniformly upon the core, so that each strand is carrying its fair share of the load. This way, the rope will assume its proper "constructional stretch" without damage, and you'll be assured of better spooling and easier handling throughout the entire life of the rope.

2 Treat it with consideration

After the rope is broken in, you can safely use whatever speeds and loads it was designed for. But don't be unnecessarily rough, even then. A smooth, gradual application of power is just as efficient as slamming into the load with a jerk. The same is true of braking. It's the heavy jerks and surge loads that beat the guts out of a piece of rope. Nine times out of ten these can be avoided without losing time.

3 Know your rope

For example, if you're using a flexible 8-strand rope for high-speed work, don't overload it. This rope is built to withstand bending fatigue and fast operation—not for heavy hogging lifts. The opposite is true of heavy-duty 6-strand rope. Lift with it—but don't try to break speed records.

4 Right maintenance means plus service

Don't neglect the few simple maintenance precautions which require so little time yet return so much in extra service. Keep your rope properly lubricated. Don't operate it over sheaves that are abraded, damaged, or out of line. Fasten clips in the approved manner. Cut off a short length from the drum end of your rope from time to time so that "grief spots" are relocated over sheaves and drums.

Wire rope is now a war weapon. Its proper use is a service to your country and to yourself. If you want good, dependable rope, and friendly service, get in touch with the Bethlehem Wire Rope distributor in your territory. He's always ready and willing to serve you.

Bethlehem Manufactures Wire Rope for all Purposes

"A Stitch in Time" Extends Bucket Life

(*Continued from page 47*)

breakage frequently occurs.

Time and materials are saved by early repair. Small cracks which can occur from the vicious banging to which dragline buckets are sometimes subjected will afterward grow into big cracks. Regular inspection and maintenance work at frequent intervals saves time, money, and prevents destructive failures in bucket bodies.

Chains on a dragline are the loose connections which attach the cables to the bucket. They relieve these cables from the worst abuse and wear which occurs close to the bucket where the actual work of excavating material is done. Wear is most rapid at the bucket end of the chains and at the side of the chain which rubs against the ground. Watch their condition and, while the bucket end is still serviceable, reverse the chains end for end to equalize their wear. Remember that there are four sides to a chain and turn the load chains over periodically to equalize this side wear on the links.

Dump blocks should hang free and straight from the hoist shackle; otherwise they won't be free to follow the line of the dump rope and wear will occur on both the block and the rope. A groove worn in the shackle, a twisted frame, or a worn sheave bushing may be responsible for faulty alignment. New bushings are procurable and a little welding will fill a worn groove. So keep the dump blocks in shape and preserve your dump ropes and lessen the wear on the blocks. A little gear compound swabbed on the hoist chains and at the dump block connection prevents wear at these points. If working in water, use water-repellent oil or castor oil for lubrication of the dump sheave. It prevents infiltration of gritty water and lengthens the life of bushings.

A vital factor in the life of a dragline bucket is the condition of the brakes and frictions on the dragline machine. The only control of the dragline bucket is through these brakes. If they are jerky and rough, the best operator cannot land his bucket in the pit smoothly. It is a long way from the dumping position at the end of the boom to the digging position down in the pit. A bucket weighing from a thousand to many thousand pounds accumulates tremendous energy if it falls unchecked, and its impact against earth, rock, or boulders is terrific. Give your operators every advantage to work well and their buckets will last longer and produce more.

Vigilance and prompt action win battles. They are also the backbone of good maintenance and will win longer life and better service from your dragline buckets.

Acknowledgement

In conclusion, we wish to acknowledge the contributions to this article from the following manufacturers, covering field experiences, points of trouble most frequently met, and other valuable suggestions: American Manganese Steel Division of American Brake Shoe & Foundry Co., Hayward Co., Osgood Co., Owen Bucket Co., Page Engineering Co., Thew Shovel Co., and Wellman Engineering Co.

Public Roads Reports On Work Done in '42

A report on the work of the Public Roads Administration during 1942 has just been issued and outlines the efforts of the PRA in meeting the needs of highway transport for war purposes. In addition to its customary activities, directed in 1942 to meet the problems of war, a number of other outstanding services were rendered by this agency. Its highway work centered on the construction of roads connecting flying fields, access roads to army training centers, the removal of bottlenecks, war industry access roads, and access roads to raw materials.

Among its outstanding services are the assignment on the Alcan Highway, the completion of the Trans-Isthmian Highway in Panama, the Flight-Strip program, great strides forward in work on the Pan American Highway, and a large amount of data supplied to war agencies, including research on war problems such as subsurface explorations, runway surfacing, camouflage, concrete ships, and materials for special uses.

The report also includes a number of tables giving data on mileages, expenditures, and similar data. Copies of this report may be secured by those interested direct from the Superintendent of Documents, Washington, D. C. Price: 10 cents per copy.

You've done your bit; now do your best! Buy more and more War Bonds.

WILLIAMS "SUPER-Hi" TENSILE TIE RODS
INEXPENSIVE U. S. STANDARD THREAD RODS

Wherever there is heavy construction, Williams "Super-Hi" Tensile Tie Rods come in for important consideration. No job is too large—none too small—to warrant Williams economy and speed.

There will be a tremendous amount of dam construction after the War, the Bureau of Reclamation reports.

Start laying your plans now—and be sure to write for complete details on the Williams Tie Rods.

WILLIAMS "VIBRA-LOCK" CLAMPS

VIBRA-LOCK CLAMP REMOVAL IS HERE ILLUSTRATED.

Use Williams *"Vibra-Lock"* Clamps for dams, bridges, heavy construction, battered walls, etc. Adjustable and flexible for all purposes, these clamps will hold the forms rigidly and produce accurate results.

Use Williams *Simplex* Clamps for best results in concrete construction for sewage disposal plants, filtration plants, and buildings.

Send us your plans, and we will figure the ties, showing locations, etc.

WILLIAMS FORM ENGINEERING CORP.
Box 925, Madison Square Station, Grand Rapids, Michigan

GEERPRES
Mop Wringer

In Service for Total Victory

Actual Savings in Mop Heads, Floors, Furniture, Time and Effort

GEERPRES WRINGER INC.
Muskegon, Mich.

ROADS *After* VICTORY

"Seamless" Bituminous Highways are Quickly Constructed . . . Low in Cost . . . Long-lasting!

Destined to be the arteries of post-war living, new highways and airports are now on drafting boards all over the world! Business men and public executives realize that communities which are first to provide *adequate* facilities for modern travel will reap *larger shares* of accelerated after-war commerce.

Experience records compiled throughout the United States point the way towards "seamless" *bituminous* construction of roads, streets and airport runways . . . free from joints and cracks . . . less vulnerable to ravages of the weather.

Motorists and pilots are delighted with resilient "cushioned" *bituminous* surfaces . . . easier on the rider . . . less wearing on the tires . . . less glaring on the eyes of the driver. And tax payers appreciate the speed of construction . . . the low original cost . . . the decreased maintenance costs . . . the long life of *bituminous* roads. Get complete details in new *free* booklet—write for *your* copy!

ETNYRE
"Black Topper"
BITUMINOUS DISTRIBUTORS

E. D. ETNYRE & CO., MAIN PLANT AND OFFICE, OREGON, ILLINOIS, U. S. A.

Avoid Legal Pitfalls

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Edited by A. L. H. STREET, Attorney-at-Law.

Some Rights Under "Grab-Bag" Contracts

When sewer contractors undertook a contract with a city they did not foresee that underground conditions would prove to require the use of compressed air in driving part of a tunnel. When the job was finished, controversy bobbed up over the contractors' right to extra compensation. They lost out before the Washington Supreme Court. (Maryland Casualty Co. v. City of Seattle, 116 Pac. 2d, 280.)

The court fully recognized the law to be "that where plans or specifications lead a public contractor reasonably to believe that *conditions indicated therein* exist, and may be relied upon in making his bid, he will be entitled to compensation for extra work or expense made necessary by conditions being other than as represented." But, upon a careful examination of all of the evidence, the conclusion was reached that the city had done nothing that amounted to an implied warranty either as to subterranean conditions or that use of compressed air would not be necessary.

The court declared that, rather than falling within the rule quoted in the first paragraph above, the case was governed by that other rule thus stated by the United States Supreme Court, per Mr. Justice Brandeis: "Where one agrees to do, for a fixed sum, a thing possible to be performed, he will not be excused or become entitled to additional compensation, because unforeseen difficulties are encountered."

Skin-Poisoning Held To Constitute Accident

Where a bridge construction worker died as a result of skin poisoning resulting from infection of abrasions by the ingredients of creosote or by poison ivy or poison oak, the Louisiana Court of Appeal decided that the death was "accidental", in such sense as to entitle his dependent family to an award under the Louisiana workmen's compensation act. (Woodward v. Kansas City Bridge Co., 3 So. 2d, 221.)

Unsigned Contract Null

A written contract without signatures on it is just so much paper—less valuable than blank paper.

A subcontractor on a tunnel job quit when money for the work done was not forthcoming. He also sued to collect. The work included some extras.

The delinquent general contractor admitted that, ordinarily, where progress payments are not made when due, the subcontractor is justified in throwing up the job and forcing a settlement for work done. But the general contractor pointed to clauses in a written document, requiring extras to be covered by written agreement, permitting him to retain money to cover labor and material claims, and requiring five days' notice of intention to quit work after ten days' default in payments by the general contractor. With more effectiveness, the subcontractor pointed to the fact that the contract was never signed.

"Burr"—the subcontractor—"was not bound by any of these provisions of the proposed but legally unexecuted contract," ruled the California District Court of Appeal. (Burr v. Pacific Indemnity Co., 128 Pac. 2d, 26.)

Computing "Net Profits" On Construction Jobs

Where a contract calls for sharing the "net profits" of a job or series of jobs, prudence demands that the agreement specify, as completely as reasonably possible, items that are to be considered in figuring the "velvet". The opinion rendered by the Appellate Division of the New York Supreme Court in the case of Martin v. City of New York, 35 N. Y. Supp. 2d, 182, gives some cues as to what specifications in the contract may serve to guard against controversy and litigation.

This case involved computation of the profits on contracts for constructing sections of a subway, in order to determine the profits an engineer was entitled to share. Here are things which the court declared should be taken into consideration:

Provision that the engineer should share in the profits of "said business" meant profits derived under the particular contracts and did not include earnings of the construction company from other ventures. (The contracts could have put this question beyond controversy by a few well chosen words.)

The following items were properly deducted from gross earnings: Interest on money borrowed to finance the particular contracts; premiums on life policies deposited as security for the loans; amounts of capital assets consumed or depreciated in performing contracts.

It is noted that the contracts involved in the New York case placed a maximum limit upon the amount of salaries of officers of the construction company that would be allocable as an expense of the jobs.

Fixing Accident Blame

Old Man Law is far more just and logical in reaching his conclusions than is sometimes thought. Especially careful is he in fixing the blame for something that has gone amiss. Take, for example, a case where an irresponsible motorist drives a car at 80 miles an hour along a highway. In broad daylight and with a perfect view of the approaching speed demon, a pedestrian walks into the path of the car and is killed. The real blame lies with the deceased, not the motorist, because the careless driving of the car would have been harmless to the pedestrian had he used due care for his own safety.

Similar reasoning was applied by the Washington Supreme Court recently in a case where a flood damaged a 60-inch wood-stave pipe temporarily used in constructing a sewer, entailing a loss of about $5,000. The sewer contractor asked reimbursement from the city against this loss on the ground that it would not have occurred had the city not directed doing the work unseasonably. But the court denied the claim, holding that had the trench in which the pipe was laid been backfilled in the manner required by the contract, the damage would not have occurred. (Maryland Casualty Co. v. City of Seattle, 116 Pac. 2d, 280.)

C. H. & E. CONSTRUCTION EQUIPMENT

Self-Priming Centrifugal Pumps

Complete line of efficient, dependable low cost pumping units, built in sizes 3000 to 125,000 gallons per hour. Non-clog impeller, large pump case for quick positive automatic priming. Write for Bulletin.

3810 N. Palmer St.

C. H. & E. Manufacturing Co.
Milwaukee, Wis.

are in there Pitching for VICTORY!

In the manufacture of Wisconsin Heavy-Duty Air-Cooled Engines miracles of production have been achieved during the past twelve months . . . a volume that would have been considered impossible a year ago. This production, distributed through diversified industrial channels, has been dedicated almost 100% to Victory . . . and will continue to be so dedicated *for the duration* . . . But we are working earnestly toward that "tomorrow" when industry, as such, can again apply these fine engines to peacetime needs.

MOST POWER Per POUND

WISCONSIN MOTOR Corporation
MILWAUKEE, WISCONSIN, U. S. A.
World's Largest Builders of Heavy-Duty Air-Cooled Engines

Since 1916
Haftrak and Traktrailer transportation by

LINN

CONTOUR-FOLLOWING TRACTION

LINN is proving invaluable in war work by moving **heavy loads** where no roads exist
The more it carries, the more it can pull.

The Linn Manufacturing Corporation
Morris, New York

DEPENDABLE

This seal is found ONLY on Blackhawk Jacks — your assurance of a wise and safe investment.

IT'S the more-for-your-money value built right into Blackhawk Hydraulic Jacks that makes them so downright dependable. They're rugged, tough, powerful; handle all jobs as they come — fast, smoothly, safely. That's why you need dependable Blackhawk Hydraulic Jacks to lick many tough wartime emergency problems of lifting, lowering, pushing, bending, testing, as well as everyday construction and maintenance jobs. Every construction engineer, foreman and maintenance man should know about MODERN Blackhawk Hydraulic Jacks, available in capacities of 3, 5, 8, 12, 20, 30 and 50 tons. Write for new Bulletin V-43 — or see your Blackhawk Distributor.

A Product of BLACKHAWK MFG. CO.
DEPARTMENT J1843 • MILWAUKEE, WISCONSIN

BLACKHAWK
MFG. CO.
Department J1843
Milwaukee, Wis.

Please rush Blackhawk Hydraulic Equipment Bulletin V-43.

Name .....

Firm .....

Address .....

BLACKHAWK
WORLD'S LARGEST MANUFACTURER OF HYDRAULIC JACKS

States Make Plans For Post-war Work On Roads of Peace

Twelve states already have the necessary laws and seven others are now considering legislation which will enable them to build the express "highways of tomorrow" when peace comes, Commissioner Thomas H. MacDonald, Public Roads Administration, announced recently. These future highways will be of the limited-access type, of which the Pennsylvania Turnpike and the Merritt Parkway in Connecticut are examples, designed to serve through traffic rather than abutting property.

Commissioner MacDonald pointed out that many states cannot now build these advanced motorways and expressed the hope that they will enact enabling legislation so that advance planning can begin. In many states, statutes limiting road widths inherited from the horse-and-buggy days prevent acquisition of adequate rights-of-way for broad modern highways, while in other cases limited-access facilities are unattainable without special legislation because of the common-law right of access of abutting property owners to a public highway.

States now legally prepared to construct limited-access highways are California, Colorado, Connecticut, Louisiana, Maine, Maryland, Michigan, New York, Ohio, Rhode Island, Virginia, and West Virginia. California and New York are actually developing detailed plans and specifications for limited-access highways for post-war construction, the advance engineering work being done as a joint Federal-state undertaking financed from the special $10,000,000 fund authorized in the Defense Highway Act of 1941 and from state funds. States with limited-access highway legislation under consideration include Arizona, Delaware, Massachusetts, New Hampshire, New Jersey, New Mexico, and Utah.

A draft of a model limited-access highway law has just been prepared by the Public Roads Administration and copies will be distributed to all the state highway departments. The model act defines two types of limited-access roads: parkways, from which trucks, busses, and other commercial vehicles are excluded; and freeways, which are open to all traffic. It stipulates that cities and other subdivisions of government as well as the state shall have authority to establish such facilities, authorizes the division of these facilities into separate roadways for each direction of travel, and prohibits access from abutting property except at designated points. It provides for acquisition of sufficient right-of-way for the facility itself and associated service roads, including rights of access, air, view, and light. It gives highway authorities power to designate existing streets or highways as limited-access facilities; with the consent of the government unit concerned, to eliminate existing intersections by means of grade-separation structures and closure; and to provide necessary local service roads separate from the limited-access facility.

A Plastic Eyeshield On Safety Hat Brims

An eyeshield to deflect hazardous flying particles has been designed for mounting on the under part of the front brim of the M. S. A. Skullgard. This transparent plastic eyeshield affords full vision and comfort. Hinged under the brim, it is positioned before the eyes by a downward flip, and when not in use lies flat against the brim, remaining firmly in either position.

Attaching this to a safety hat is simple. Four holes are drilled in the brim by means of a template, and rivets furnished with the eyeshield secure the shield's two hinges to the brim of the safety hat. With hinges in "down" position, the keyhole slots in the eyeshield are slipped over the stud on each hinge. The position of the shield in front of the eyes can be adjusted by bending the hinge tips.

For full information regarding the new M. S. A. Skullgard eyeshield of the hinged type, write direct to Mine Safety Appliances Co., Braddock, Thomas & Meade Sts., Pittsburgh, Pa., for Bulletin No. C E-18 and mention this item.

Snow Plows Used on Buses To Plow Roads in England

The Northumberland County Council in England recently concluded an agreement under which snow plows will be attached to common carrier buses on certain roads when needed, according to a report received here. The transportation company will receive compensation when a bus is engaged solely for this work, but not when operating on regular schedules.

Athey Promotes Ben Lease

Ben F. Lease, formerly Manager of Service and Research of the Athey Truss Wheel Co., Chicago, Ill., has been made Domestic Sales Manager of that company. Well-known throughout the construction-equipment industry, Mr. Lease joined Athey in 1931 as District Representative, in a short time was made Special Representative, and then was made Manager of Service and Research.

This company manufactures Forged Trak trailers, Force Feed loaders and MobiLoaders, with sales and service handled through Athey-Caterpillar dealers.

FOR BIGGER PAY-LOAD DIGGING
HAISS
HI-POWER
LOWER SHEAVES HIGH ABOVE COUNTERWEIGHT!
Up out of the muck. Non-pocketed. No place for dirt to jam, to cause friction or rope wear . . . in one test, 40% better efficiency than next best bucket.
Bucket Agencies throughout the country. Write or wire for prices, delivery and catalogs.
GEORGE HAISS MFG. CO., INC., CANAL PL. & E. 142nd ST., NEW YORK

Get In and Out Profitably
H & B stationary and gravity type portable plants are also available in batch capacities of 300 to 8,000 lbs.

ON THE SMALL TONNAGE, "HARD-TO-REACH" ASPHALT JOBS...

THE *"Brass Brain"* (FLUIDOMETER)

This automatic metering system saves time, materials — insures uniformity. For all types of plants.

THIS Model MH Hetherington & Berner portable asphalt plant is a *full-size* wheel mounted plant with all units on the ground—no erection required. The dryer is built on a substantial steel frame, equipped with tandem axle and fifth wheel, permitting the unit to be moved with any standard truck-tractor. The mixer unit, arranged as a semi-trailer, utilizes same axle as the dryer unit. The anti-friction bearings and 2,500 lb. steam jacketed mixer make this the equivalent of stationary plants in sturdiness and capacity. With this plant you can get in and out profitably on the small-tonnage, hard-to-reach jobs, with a minimum investment in running gear. Write for Bulletin CMH-20.

HETHERINGTON & BERNER Inc.
INDIANAPOLIS • INDIANA

Hetherington & Berner

CUT
3/8 yd. and 1/2 yd.
Convertible to standard front-end attachments.
Cut job-time — travel-time between jobs — initial and maintenance costs . . . employ MICHIGAN Mobile Draglines — Operator-approved for driving ease and non-fatiguing Air Controls. Ask for Bulletin D.
MICHIGAN
POWER SHOVEL COMPANY
BENTON HARBOR MICHIGAN

Two-Way Radio Aids Kansas Highway Work

(*Continued from page 44*)

form known to the local citizen or order as evidencing police authority ed by the gun on the hip of the lman. Therefore, a call is put in at when a bridge goes out, or threatens sh away, and patrolmen are on the in a few minutes.

troubles with heavy transport have been mentioned in these before, as the trouble is nation- where there is snow. The drivers e stopping to put on chains and run the limit until they are in danger dding off the road. Then they will knife their trucks and semi-trailers block traffic so that the state high- snow-removal forces have to pull out in order to let traffic pass. This happened so frequently during ice s or sleet storms in Kansas that the rs now are to call the highway and make an arrest every time the tenance forces find such a case, as are invariably deliberate. The radio ds the call.

During snow storms and ice storms, master transmitter at the Mainte- ce Engineer's office is manned 24 rs a day by someone with authority give orders to various maintenance s as emergency conditions arise. ally L. L. Marsh, State Maintenance ineer, or Leo J. Siler, Assistant Main- nce Engineer, is on duty, taking at the microphone and telephone, ing orders in the most convenient ner, by radio or telephone. With im- ant snow-removal units eventually ipped with 2-way radio, it will be ossible for them to be "lost" from dquarters as is often the case now, hout any means of getting in com- nication with them except by sending a messenger.

If no other benefits accrued at the ent time, the saving in mileage of cars would be well worth the invest- t in the radio. Also during one in- tion trip with W. K. Dinklage, Divi- Engineer, it was noted that two rgency long-distance telephone calls, rted by radio, were answered mptly at the next small town, some- t to the astonishment of the local rator, and a conference was arranged.

The State Highway Commission of Kansas is headed by D. J. Fair, Director, with R. C. Keeling, as State Highway Engineer, and L. L. Marsh, State Main- nance Engineer.

Road Workers Subject To Wage and Hour Law

In the two first cases involving the status of construction employees under the Fair Labor Standards Act which have reached the United States Supreme Court, the Court has held that employees engaged in the maintenance and repair of toll roads and bridges as well as railroad bridges are engaged in commerce and hence amenable to the Act.

In one case (Overstreet v. North Shore Corp.) the decision of the court that employees of a toll road company engaged in the maintenance and repair of a toll road and draw bridge are subject to the Act upheld previous interpretations by the Wage and Hour Division of the Department of Labor regarding construction operations, as enunciated in Interpretative Bulletin No. 5. In the other case, (Pedersen v. J. F. Fitzgerald Construction Co.), the Supreme Court reversed a decision handed down by the New York Court of Appeals which held that employees of a construction company engaged in constructing new abutments and repairing superstructures of railroad bridges were not covered by the Act. In so ruling, the Court affirms its holding in the Overstreet case and places highway facilities in the same category as railroad facilities.

It should be noted that these decisions deal only with maintenance and repair of facilities indispensable to interstate commerce, leaving the question of employees engaged in construction operations subject to further judicial determination. The whole question of the Wage and Hour Law and its applicability to the construction and highway field was discussed in an article beginning on page 17 of the February, 1943, CONTRACTORS AND ENGINEERS MONTHLY, in which the very point under review in these decisions is discussed.

Our Airports must be built...
FOR KEEPS!
DESIGNED REINFORCED CONCRETE RUNWAYS
CAN ENDURE TO SERVE POST-WAR AVIATION
REINFORCING STEEL IS AVAILABLE Use it!

The Specification of Laclede's Complete Line of Proved Pavement Reinforcement Conserves Vital Materials by Building Well.

- Welded Wire Mesh
- Reinforcing Bars: Billet Steel, Rail Steel
- Steel Center Joint
- Recess Joint
- Expansion Joints
- Contraction Joints
- Welded Dowel Spacers
- Welded Bridge Floor Trusses
- Pavement Accessories
- Bridge Accessories
- Steel Pipe
- Wire
- Welded Stirrups

LACLEDE

LACLEDE STEEL COMPANY
GENERAL OFFICES ARCADE BUILDING ST. LOUIS, MISSOURI
BRANCH OFFICES: CHICAGO • KANSAS CITY • DETROIT

STOODY'S new engineering style specification sheets were compiled from information furnished by operators of construction equipment. They contain more and later information on methods of applying Stoody Hard-Facing Metals to wearing parts. Concise paragraphs give material requirements, rebuilding and hard-facing procedures and estimated service life of twenty wearing parts ordinarily requiring frequent replacement or repair. Large photographs illustrate appearance of properly hard-faced parts and sketches show extent and area of deposits.

To conserve paper we have printed a limited quantity of these Specification Sheets. For this reason, copies are restricted to those concerns engaged on essential projects where wear is a major problem. If you feel that you qualify, fill in and return the coupon, your copy will be mailed immediately.

Please send the Specification Sheets on maintaining construction equipment.
NAME
TITLE
COMPANY
ADDRESS
CITY STATE

STOODY COMPANY
1131 WEST SLAUSON AVENUE • WHITTIER, CALIFORNIA

STOODY HARD-FACING ALLOYS
Stop wear... Eliminate Repair

INDEX TO ADVERTISING

Aeroil Burner Co., Inc. 34
Agerstrand Corp. 35
Allis-Chalmers Mfg. Co. 19
American Cable Division 13
American Steel Scraper Co. 29
Armco Drainage Products Assn. 52
Austin-Western Road Machy. Co. 16
Bailey Vibrator Co. 12
Barber-Greene Co. 46
Barrett Division, The 47
Bartlett Mfg. Co. 8
Beebe Bros. 23
Bethlehem Steel Corp. 59
Blackhawk Mfg. Co. 61
Blaw-Knox Division 24
Brooks Equip. & Mfg. Co. 45
Buckeye Traction Ditcher Co. 53
Bucyrus-Erie Co. 23
Buffalo-Springfield Roller Co., The 56
Butler Bin Co. 52
Carbo-Flo Mfg. Co. 55
Carey Co., Philip, The 28
Carver Pump Co. 45
Case Co., J. I. 11
C. H. & E. Mfg. Co. 61
Chevrolet Motor Division 22
Chicago Pneumatic Tool Co. 57
Cleaver-Brooks Co. 12
Cleveland Rock Drill Co., The 21
Cleveland Tractor Co. 55
Clyde Iron Works 39
Complete Machy. & Equip. Co., Inc. 27
Concrete Chemical Co. 40
Construction Machy. Co. 36
Davenport Besler Corp. 41
Dempster Brothers, Inc. 19
DeSoto Foundry, Inc. 27
Embury Mfg. Co. 10
Etnyre & Co., E. D. 60
Euclid Road Machy. Co. 18
Fiske Bros. Refining Co., Lubriplate Div. 42
Flexible Road Joint Mach. Co. 25
Fulton Bag & Cotton Mills 48
Galion Iron Works & Mfg. Co. 15
Gardner-Denver Co. 28
Geerpres Wringer, Inc. 60
General Motors Diesel Engine Div. 14
Griffin Wellpoint Corp. 14
Gruen Watch Co. 37
Haiss Mfg. Co., George 62
Hayward Co., The 57
Heil Co., The 49
Hercules Co. 44
Hercules Steel Products Co. 36
Hetherington & Berner Inc. 62
Hobart Bros. 38
Howe-Simpson, Inc. 47
Iowa Mfg. Co. 35
Jaeger Machine Co., The 43
Kinney Mfg. Co. 59
Koehring Co. 40
Laclede Steel Co. 63
LaCrosse Trailer & Equip. Co. 21
LeTourneau, Inc., R. G. 9
Lidgerwood Mfg. Co. 11
Link-Belt Speeder Corp. 25
Linn Mfg. Co. 61
Lister-Blackstone, Inc. 22
Littleford Bros. 30
Madsen Iron Works 58
Mall Tool Co. 56
Marion Steam Shovel Co. 51
Marlow Pumps 36
Marmon-Herrington Co., Inc. 26
Marvel Equipment Mfrs. Inc. 20
Master Builders Co. 17
McCaffrey-Ruddock Tagline Corp. 47
McKiernan-Terry Corp. 31
Meadows, Inc., W. R. 16
Michigan Power Shovel Co. 62
Murphy Diesel Co. 18
Novo Engine Co. 56
Owen Bucket Co., The 30
Parsons Co. 29
Pettibone Mulliken Corp. 44
Reliance Pencil Co. 26
Richmond Screw Anchor Co. 54
Robins Conveying Belt Co. 37
Rodgers Hydraulic, Inc. 5
Roeth Vibrator Co. 53
Rogers Bros. Corp. 50
Rototiller, Inc. 38
Sand's Level & Tool Co. 29
Sasgen Derrick Co. 35
Schramm, Inc. 43
Seaman Motors 48
Servicised Products Corp. 48
Sinclair Refining Co. (Inc.) 10
Slope-Meter Co. 38
Smith Engineering Works 41
Solvay Sales Corp. 9
Standard Oil Co. of Calif. 50
Standard Steel Corp. 54
Stang Corp., John W. 42
Sterling Machinery Corp. 15
Sterling Wheelbarrow Co. 58
Stoody Co. 63
Texas Co., The (asphalt) 3
Texas Co., The (lubricants) 6, 7
Thew Shovel Co. 8
Thompson Materials Corp. 39
Toro Mfg. Corp. 24
Union Iron Works, Inc. 46
Universal Engineering Corp. 20
Universal Power Corp. 51
Viber Co. 49
Vulcan Tool Mfg. Co. 30
Walter Motor Truck Co. 31
Wellman Engineering Co., The 52
White Mfg. Co. 13
Williams Form Engineering Corp. 60
Williams Roofing Products Co. 17
Wickwire Spencer Steel Co. 34
Wisconsin Motor Corp. 61

Contractors and Engineers Monthly

At left, the deepest cut on the G. W. Mendenhall & Sons Construction Co.'s highway grading contract in Utah, showing the carefully rounded and well-dressed slopes. This company received the Western Section Award in our 1941-42 Roadside Development Awards. See page 17.

Scenes at the District 2 garage of the Arkansas State Highway Department at Pine Bluff, Ark. Above, the interior of the storage garage with a Chevrolet dump truck, a Littleford distributor on a Ford truck, and a Warco power grader; at left, a pair of Allis-Chalmers tractors with mowers; below, a view of the yard and repair garage from the storage garage. See page 8.

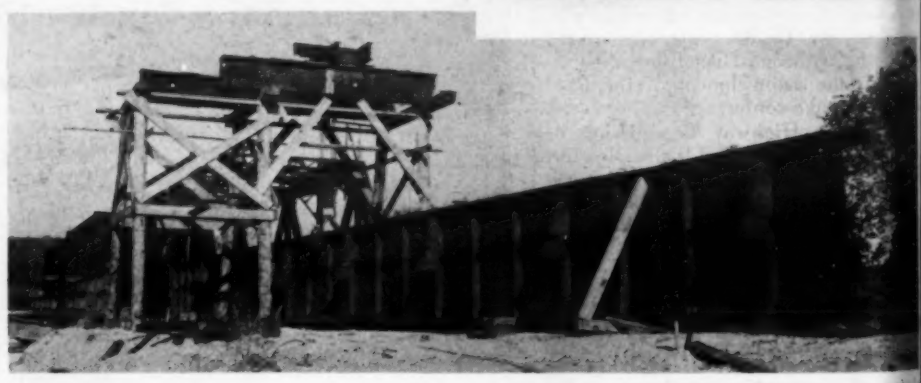
C. & E. M. Photos

Top left, a part of the team who put through the $245,000 highway relocation job on U. S. 60-70 in Arizona: left to right, C. B. Browning, Resident Engineer; W. E. Orr, contractor; Harry Duberstein, formerly Right-of-Way Agent; and E. V. Miller, Chief, Division of Plans, Arizona State Highway Department. Middle photo, a Caterpillar No. 12 power grader mixing oil-mat. Bottom photo, a 70,000-yard rock cut. See page 2.

C. & E. M. Photos

Below, the frame and multiple sheave with a 17-part steel cable line and tongs for handling 150-foot steel girders at the White River Bridge on U. S. 50 west of Cincinnati, Ohio. See page 6.

C. & E. M. Photo



The old and new in bridges along the new 4.1-mile access road to Fort F. E. Warren in Wyoming. See page 11.

C. & E. M. Photos